Dietetics and weight management in primary health care

Tol, Jacqueline

Publication date:
2015

Document Version
Publisher's PDF, also known as Version of record

Dietetics and weight management in primary health care

Jacqueline Tol

ISBN 978-94-6122-307-4

http://www.nivel.nl
nivel@nivel.nl
Telephone +31 30 2 729 700
Fax +31 30 2 729 729

Cover design: Tessa van den Heuvel
Lay Out: Karin van Beek
Printing: Proefschriftmaken.nl

Dietetics and weight management in primary health care

Diëtetiek en gewichtsmanagement in de eerstelijnsgezondheidszorg

Proefschrift

ter verkrijging van de graad van doctor aan Tilburg University
op gezag van de rector magnificus, prof. dr. E.H.L. Aarts,
in het openbaar te verdedigen ten overstaan van
een door het college voor promoties aangewezen commissie
in de aula van de Universiteit op
vrijdag 6 november 2015 om 14.15 uur

door

Jacqueline Tol,
geboren op 5 mei 1985 te Boxmeer

Promotores:	prof. dr. D.H. de Bakker prof. dr. ir. J.C. Seidell prof. dr. C.Veenhof
Copromotor:	dr. I.C.S. Swinkels
Promotiecommissie:	prof. dr. W.J.J. Assendelft prof. dr. C.A. Baan prof. dr. L.A.M. van de Goor prof. dr. J.W.R. Twisk dr. ir. P.J.M. Weijs

The research presented in this thesis was conducted at the Netherlands Institute for Health Services Research (NIVEL), Utrecht, the Netherlands.

Contents

1

General introduction

General introduction

This thesis focuses on understanding utilization of dietetic services in Dutch primary health care. More transparency on this topic is needed considering the rising prevalence of nutrition related diseases and important changes in the Dutch healthcare insurance system.

Noncommunicable diseases (NCDs), such as cardiovascular diseases, cancers, chronic respiratory diseases and diabetes are increasing around the world and are the biggest cause of death globally [1]. Unhealthy lifestyles, including unhealthy dietary patterns, are among the key risk factors for these NCDs. Unhealthy diets may show up in individuals as raised blood pressure, increased blood glucose, elevated blood lipids, overweight and obesity. Overweight and obesity have reached epidemic proportions globally [2]. Obesity rates are among the highest in the United States. In 2011-2012, 69% of US adult were overweight, including obesity (35%) [3]. The prevalence rates of obesity did not change since 2009-2010 [4]. A stabilization of prevalence rates during the last years have been observed in the Netherlands too [5]. In 2013, about half of the adult population (48%) were overweight, including obesity (12%) [6].

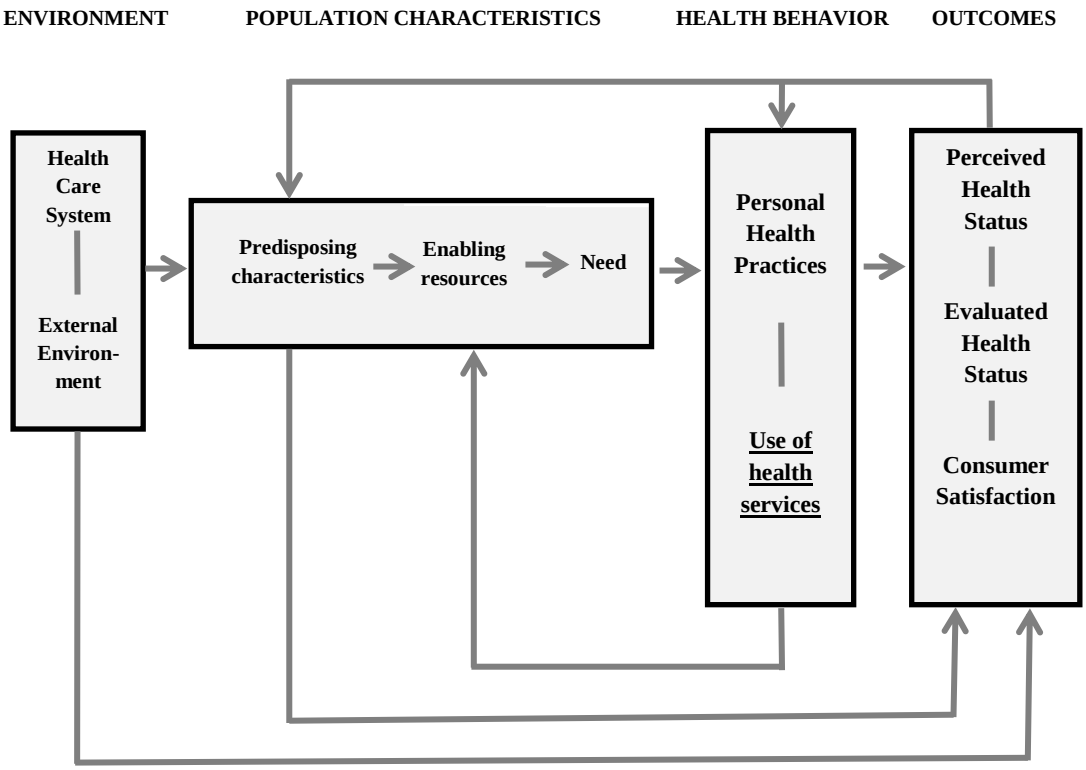
The fundamental cause of overweight and obesity is a long-term imbalance between energy intake from the diet and energy expenditure from physical activity and bodily functions. Multiple factors can influence the condition, such as genetics, environmental, social, cultural, behavioral, physiologic and metabolic factors [2]. Nowadays, the market provides many weight-loss strategies for people willing to lose weight. However, many people find it difficult to lose weight and persist their new weight on the long term. Therefore, it is important for patients to offer effective weight loss programs. In the Netherlands, there is national attention for the provision of effective weight-loss strategies of overweight and obese patients. For example, national guidelines describe the tests, treatment, care and support that patients need. The Care Standards, for example, describe the whole package of care services and treatment activities for a given disease [7, 8] and nutritional guidelines describe diet specific criteria [9, 10]. Additionally, there is a growing attention for patient-centered health care. For example, the

development of individual care plans are increasingly stimulated, taking into account the wishes and aims of the patient at treatment start [11]. In general, recommended strategies to help patients achieve weight loss and maintenance focus on a combination of nutrition, physical activity and behavioral modification [10].

Primary care providers regularly encounter patients with NCDs or with important risk factors, such as overweight and obesity [12]. Therefore, the primary care sector is an important area to address unhealthy dietary patterns. A primary care provider who regularly encounters these problems is the dietitian. For example, about 70% of the dietitians' patients visit the dietitian for overweight or obesity and about one out of four patients is treated for diabetes mellitus [13]. According to their professional standards, dietitians focus on assessing patients' diet and nutritional status and provide practical evidence-based advice on all aspects of nutrition and diet in order to promote health, prevent disease and manage nutrition related conditions [14].
Given that dietary treatment is an important aspect of the prevention and management of NCDs [15], one may believe that high prevalence of non-communicable diseases is an indicator for increased use of dietary services. However, despite increased likelihood of use, the actual use of dietetic care services is relatively low: approximately 2% of the Dutch population used dietetic healthcare for various reasons in 2010 [16]. A better understanding of why people use or do not use these services may help dietitians to improve the quality of their service, which may potentially contribute to the prevention and treatment of NCDs in future.

In general, the literature describes many models that help understand health services use. One of the most widely acknowledged models of health services use is Andersen's health behavioural model [17]. This model was developed to understand health services use and to measure and promote equitable access to health care [18]. The model suggests that people's use of health services may be increased or decreased through environmental aspects, population characteristics, health behavior and outcome (see Figure 1). These four aspects are used in this thesis to help explain use of dietetic care in the Netherlands.

Figure 1: Andersen's health behavioral model [11]



Environment

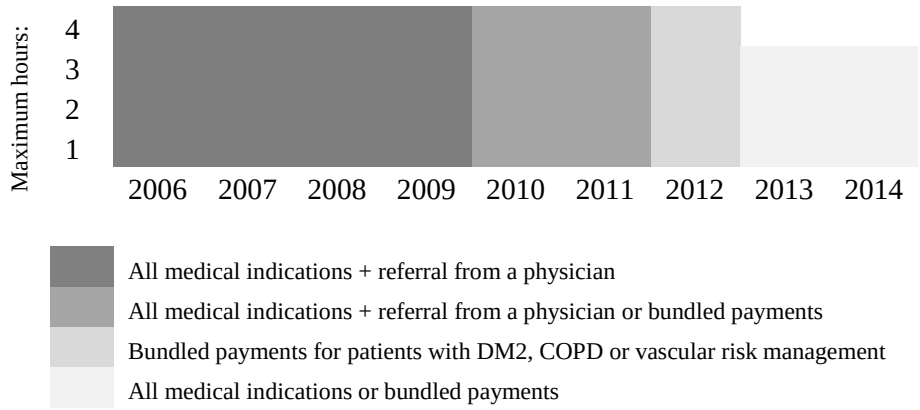
Environmental aspects cover the external environment and health care system. The external environment includes physical, political and economic components. The healthcare system was included in the model to give recognition to the importance of health policy, the resources (such as personnel and geographical distribution) and their organization in the health care system [18].

The external environment can tackle important risk factors of NCDs, such as physical inactivity and unhealthy dietary patterns. The Dutch government takes action against the prevention of NCDs. For example, since 2006, overweight has been one of the main objectives of the prevention policy of the Dutch government. Furthermore, in 2010 a unique collaboration of 26

parties from national and local authorities, the industry and societal organizations was created called “het convenant gezond gewicht”. Together they work on an integral method for obtaining a healthy weight in youth and adults. During the last few years, many overweight prevention initiatives took place, such as: development of an integrated health care standard for the management and treatment of obesity; development of combined lifestyle interventions, such as “de Beweegkuur”; tasting lessons and breakfast on schools; stimulating sport and exercise in local communities; more green space in the neighbourhood; reduction of trans fatty acids and salt in products; and the ‘I choose consciously’ logo on more healthy products [19].

The Dutch health care system includes both curative as well as preventative elements and the organization has undergone a major transformation during the past years. In 2006 a new health insurance act was implemented aiming to increase fairness, transparency and efficiency of health care for the patient [20]. Every citizen in the Netherlands is obliged to take out insurance policy for the standard package, including, among others, reimbursement for dietary advice. The volume of care and conditions for reimbursement of dietetic care has changed during the last years (see Figure 2). This may have had consequences for the accessibility and utilization of dietetic services in Dutch primary health and therefore need to be examined.

Figure 2: Changes in reimbursement for dietetic treatment by the standard health insurance cover in Dutch primary care



The insurance companies are obliged to offer a standard insurance package at a fixed price for everyone and are obliged to accept anyone who applies for a standard insurance package. For most aspects, including dietary advice, an own-risk element applies. People can also buy additional health insurance cover with the same or with another company on which they hold the standard insurance package. Coverage in additional health insurance packages varies between health insurance companies as well as including coverage of preventive health care services. Once a year, people are allowed to switch between health care insurance companies, with effect from January, 1st. Consequently, competition between insurers is stimulated [21].

In 2010, the Dutch Minister of Health approved the implementation of a structural, bundled payment approach for several NCDs, i.e. diabetes mellitus type 2, chronic obstructive pulmonary disease, and vascular risk management. In this bundled payment model, insurers now pay a single fee to a contracting entity called a care group, to cover all the primary care needed to manage a chronic condition [22]. In cases where the patient received care from a disease management program, the dietitian could no longer claim the delivered dietetic care directly from the health care insurer, but purchase the dietetic care that was contracted within the care group by the system of bundled payments. The implementation of bundled payments may have a major impact for the profession of dietetics, since dietitians frequently treat patients with these kind of conditions [13].

Until august 2011, dietitians were only accessible with a referral from a physician. The role of the referrer can therefore be considered as an important factor in dietetic health services use. Criteria for referring overweight persons to other health care professionals for nutritional or dietary advice are outlined in the Obesity Standard of the Dutch College of General Practitioners (NHG). However, they allow room for general practitioners to manage their own referral policy for weight management, which may in turn influence dietetic health service use. Direct access to allied health care providers, including dietitians, was approved by the Ministry of Health Welfare and Sport in August 2011 [23]. These changes in the health care organization strengthens the patients' position by giving them a greater choice in health care insurer and provider, and greater financial

responsibility. Consequently, the health care system includes more competitive elements for insurers and healthcare providers including dietitians.

These organizational changes in healthcare system may have serious consequences for supply and demand of dietetic health services. Is it important for patients, health care professionals, health care insurers and policy makers to know how these changes have affected the profession of dietetics. Therefore, greater insight in dietetic health care utilization is necessary.

Population characteristics

Population characteristics of Andersen's model include predisposing factors, enabling resources and need factors [18].

Predisposing factors of an individual concern demographic characteristics, social structure in which he/she participates, and his/her health beliefs. Demographics were shown to be of importance in the field of dietetics, since more women visit the dietitian than men [13]. The status of a person in the community is determined by membership of specific social structures. Membership of a specific social structure can affect the ability to cope with health problems, or the likeliness of a healthy physical environment. Education, occupation and ethnicity are used as traditional measures to assess the place of a person in the social structure. There is a strong empirical relationship between socio-economic status and unhealthy behaviors, which encompass diverse underlying mechanisms. For example, less educated persons may have limited knowledge of the harm of unhealthy behavior and therefore less motivation to adopt healthy behaviors [24]. These aspects may influence the decision to use dietetic services.

Enabling resources, such as income and health insurance coverage make health services resources available to the individual. Sufficient enabling resources may help promote equitable access of health care. Equitable access occurs when demographic and need variables are especially responsible for health services use whereas inequitable access is a result of variation in social structure, health beliefs, and enabling resources [18]. Equitable access should therefore be promoted in health care. Theoretically, patients in the

Netherlands have the potential to access a dietitian, as dietary advice is reimbursed by the standard health insurance. However, due to the own-risk element in the standard healthcare insurance package, patients' incomes may influence the uptake of dietetic services.

Health services use may also be influenced by need factors, such as the belief that one has a serious health problem (perceived need), or the need for medical care (evaluated need). Considering the high prevalence of overweight and obesity and the complexity of this multifactorial problem, the evaluated need for dietary treatment is high. However, the perceived need for dietary treatment may be lower as it depends on attitudes, values and knowledge about health and health services. For example, the beliefs about weight, or perceptions, expectations and trust in caregivers may also influence one's decision to seek professional help. Examining these population characteristics may contribute to our understanding of the relatively low use of dietary health services.

Health behavior

In Andersen's health behaviour model, health behavior is subdivided into personal health practices and actual healthcare use.

Personal health practices such as diet, exercise, and self-care may interact with dietetic healthcare use to influence health outcomes. For example, if people are ready to change behavior, not all judge their problems to be of sufficient importance to seek professional help but change behavior without help from a caregiver.

If people have decided to use dietetic health care, the intensity of care delivery may vary and depend on several aspects. For example, in 2013 41% of patients consulted the dietitian once or twice a year, though, a small group of patients (5%) consulted the dietitian more than eight times in one year [13]. In general, variation in the number of consultations per treatment can occur on different levels, e.g. that of the organization, therapists and patients. Variation between practices and healthcare providers is not uncommon in health services research. Substantial inter-practitioner variation may suggest a potential to increase efficiency and improve quality [25]. It is unknown whether inter-practitioner variation exists in dietetic treatment. More

knowledge about variation in consultation sessions might help to eliminate variation in dietetic care utilization that cannot be explained by disease, patient preference or evidence based medicine.

Outcomes

The model also consists of health outcomes, including perceived and evaluated health status and consumer satisfaction [18]. Feedback loops are also included and demonstrate that outcome, in turn, affect perceived need for services as well as health behavior. For example, positive outcomes of dietetic treatment may influence other people's health beliefs, which may in turn influence dietetic health services use, and vice versa. Additionally, beliefs of health politicians, referrers and patients on the effectiveness or outcome of dietetic care may also determine dietetic health services use.

Many studies have evaluated the effect of diets or dietary counselling on health outcomes [26, 27]. However, a short review of the literature shows limited research that specifically examined the influence of the dietitian compared to either other providers or other diet methods on health outcomes. Some randomized controlled trials (RCTs) have shown that patients with cardiovascular risk factors who received dietary counselling from a dietitian achieved significantly larger weight loss when compared with other methods, such as other providers [28-33], or no intervention / a diet leaflet [34-37]. In addition, some RCTs reported significant improvements in HbA1c levels [28, 37-39] or blood cholesterol [40] in favor of the dietitian group compared to doctors. However, others did not find a significant difference in weight losses [38, 41-43] or HbA1c [33, 44] by dietitians compared to other methods. Additionally, a literature review showed no statistically significant difference in change in blood cholesterol between dietitians and self-help resources [40].

In general, the results of RCTs do not show consensus on the effectiveness of dietetic treatment compared to other methods in reducing cardiovascular risk factors. Furthermore, the results should be interpreted with caution because some studies were not of good quality. Another possible weakness of these intervention studies is that the results in each study were based on

the effectiveness of a single dietitian, while there might be differences between dietitians which could lead to different health outcomes [45]. Therefore, more studies in 'real life' situations are recommended, such as in a primary health care setting, to observe the outcome of dietetic treatment and to investigate whether there are differences between dietitians.

Furthermore, few quantitative studies are performed on perceived health outcomes of dietetic treatment. A RCT by Delahanty showed that some measures of quality of life have improved more by dietetic treatment compared to physician treatment [46]. Wolf et al. also showed higher improvement of health related quality of life after 12 months of intensive dietetic treatment compared to educational material [37].

Little is known on patients' satisfaction with dietetic treatment. Delahanty showed that satisfaction with treatment was significantly higher after dietetic treatment compared to physician treatment [46]. Qualitative research showed that the more empathic dietitians respond to patients, the more satisfied patients were with their consultations [47]. Additionally, patients value elaboration on information, advice by dietitians, a nonprescriptive approach, collaboration and dietitians who are listening, showing rapport, empathy and support [48]. More quantitative research on patients' satisfaction with the care they receive from dietitians, along with details of their experiences with dietetic treatment may provide valuable important information about the quality and outcome of care from a patients' perspective. This information may help identify areas where dietetic care can be improved.

Aim and outline of this thesis

The aim of this thesis is to increase understanding of utilization of dietetic health care, and to improve the understanding of factors that are associated with dietetic health care use in Dutch primary health care. The research questions of this study are related to the four topics of health care utilization: environment, population characteristics, health behavior and outcomes and will be answered in Chapters 2 to 8.

Chapter 2 examines environmental aspects of dietetic health care utilization by focusing on changes in the organization of dietetic services, specifically the introduction of the bundled payment system which may influence the supply of services. The research questions in this chapter are:

- *To what extent are Dutch primary healthcare dietitians involved in disease management programs financed through bundled payments?*
- *What are the experiences and opinions of Dutch primary healthcare dietitians with regard to working in disease management programs financed through bundled payments?*

Chapter 3 describes other environmental aspects of dietetic health care utilization namely the role of the referrer. The research question in this chapter is:

- *Is there variation in general practitioners' referral policy of patients with obesity to other health care professionals for nutritional or dietary advice?*

Chapter 4 evaluates the effect of reimbursement policy on use of dietetic health services. The related research questions are:

- *What is the influence of changes in reimbursement for dietary advice on the number of patients visiting the dietitian?*
- *What type of population and practice characteristics are associated with the number of patients visiting the dietetic practice after limiting reimbursement for dietary advice?*

Chapter 5 investigates the association between population characteristics and health behavior, such as readiness to lose weight and intention to use self-care or weight-related care. The research questions are:

- *What type of population characteristics are associated with readiness to lose weight in an overweight population?*
- *What type of population characteristics are associated with the intention to use weight-related care in an overweight population ready to lose weight?*

Chapter 6 investigates the association between predisposing characteristics on the intensity of dietetic health services use. The research questions are:

- *What are the sources of variability in the number of consultations per dietetic treatment?*
- *What type of predisposing characteristics are associated with the number of consultations per dietetic treatment?*

Chapter 7 examines the association between predisposing characteristics and intensity of dietetic health services use on evaluated health status. The research questions in this chapter are:

- *What is the effect of dietetic treatment in primary care on overweight patients' mean change in body mass index?*
- *What are the sources of variability in overweight patients' change in BMI?*
- *What is the association of predisposing characteristics and duration of dietetic treatment on overweight patients' change in BMI?*

Chapter 8 describes the association of population characteristics, intensity of dietetic health services use and perceived health outcomes on consumer satisfaction with dietetic treatment. The following research questions are addressed:

- *What is the association of population characteristics and dietetic health care use on patients' experiences with dietitians?*
- *What is the association of patients' experiences and expectations with dietitians on overall satisfaction with dietetic treatment?*

Chapter 9 will discuss the study findings and reflects on the relevance for further research and practice while considering the strengths and weaknesses of the studies.

References

1. World Health Organization. Noncommunicable diseases country profiles 2011. Geneva: WHO, 2011.
2. World Health Organization. Obesity and overweight. Fact sheet N°311. Geneva: WHO, 2013.
3. Centers for Disease Control and Prevention. Table 64. Selected health conditions and risk factors, by age: United States, selected years 1988–1994 through 2011–2012 Atlanta: CDC; 2014 [cited August 6, 2014]. Available from: http://www.cdc.gov/nchs/data/hus/hus13.pdf#064 .
4. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of obesity among adults: United States, 2011–2012. NCHS data brief, no 131. Hyattsville, MD: National Center for Health Statistics, 2013.
5. Rijksinstituut voor Volksgezondheid en Milieu. Een gezonder Nederland - de Volksgezondheid Toekomst Verkenning 2014 [the future study on public health in the Netherlands 2014]. Bilthoven: RIVM; 2014 [cited November 12, 2014]. Available from: http://www.eengezondernederland.nl/Heden_en_verleden/Determinanten.
6. Centraal Bureau voor de Statistiek. Lengte en gewicht van personen, ondergewicht en overgewicht; vanaf 1981 [Height and weight of persons, underweight and overweight; from 1981]. Den Haag: CBS; 2013 [cited February 13, 2013]. Available from: http://statline.cbs.nl/StatWeb/publication/?VW=T&DM=SLNL&PA=81565NED&LA=NL .
7. Nederlandse Diabetes Federatie. Zorgstandaard diabetes type 2 [Care standards diabetes type 2]. Amersfoort: NDF [cited 2015 8 January]. Available from: http://www.zorgstandaarddiabetes.nl/type-2/.
8. Platform Vitale Vaten. Zorgstandaard cardiovasculair risicomanagement 2013 [Care standard cardiovasculair risk management 2013]. Den Haag: Platform Vitale Vaten; 2013 [cited 2015 8 January]. Available from: http://www.vitalevaten.nl/projecten/zorgstandaarden/zorgstandaard-cvrm-2013.html.
9. Nederlandse Diabetes Federatie. Voedingsrichtlijn voor diabetes type 1 en 2 [Nutritional guideline for diabetes type 1 and 2]. Amersfoort: NDF, 2010.
10. Kwaliteitsinstituut voor de Gezondheidszorg CBO. Richtlijn diagnostiek en behandeling van obesitas bij volwassenen en kinderen [Guideline diagnostics

and treatment of obesity in adults and children]. Utrecht: Van Zuiden Communications; 2008.

11. Zorginstituut Nederland. Raamwerk individueel zorgplan [Framework for an individual careplan]. 2012 [cited November 17, 2014]. Available from: http://www.zorginstituutnederland.nl/kwaliteit/kwaliteitsbibliotheek/zorgstandaarden#RaamwerkIndividueelZorgplanIZP.
12. Nielen MMJ, Spronk I, Davids R, Zwaanswijk M, Verheij RA, Korevaar JC. Incidentie en prevalentie van gezondheidsproblemen in de Nederlandse huisartsenpraktijk [Incidence and prevalence of health problems in Dutch general practices] Utrecht: NIVEL Zorgregistraties eerste lijn 2012 [updated 17-12-2013; cited March 18, 2014]. Available from: www.nivel.nl/node/3094.
13. Tol J, Swinkels ICS, Koppes L. Zorg door de diëtist. Jaarcijfers 2013 en trendcijfers 2009-2013 [Dietetic healthcare. Annual statistics 2013 and trends 2009-2013]. Utrecht: NIVEL, 2014.
14. Nederlandse vereniging van diëtisten. Beroepsprofiel diëtist [Professional profile]. Houten: NVD, 2013.
15. World Health Organization. Diet, Nutrition and the prevention of chronic diseases. Geneva: WHO, 2003.
16. de Graaf-Ruizendaal WA, Kenens RJ, de Bakker DH. Vraag aanbod analyse monitor – Verantwoording rekenmodellen versie 3.1 [Demand Supply Analysis Monitor - Explaining mathematical models version 3.1]. Utrecht: NIVEL; 2012.
17. Babitsch B, Gohl D, von Lengerke T. Re-revisiting Andersen's Behavioral Model of Health Services Use: a systematic review of studies from 1998-2011. Psychosoc Med. 2012;9:Doc11.
18. Andersen RM. Revisiting the behavioral model and access to medical care: does it matter? JHealth SocBehav. 1995;36(1):1-10.
19. Ministerie van Volksgezondheid, Welzijn en Sport. Landelijke nota gezondheidsbeleid ‘Gezondheid dichtbij’ [National nota healthcare policy ‘Health nearby’]. Den Haag: VWS, 2011.
20. World Health Organization. The new Dutch health insurance scheme: challenges and opportunities for better performance in health financing. Geneva: WHO, 2007.

21. Government of the Netherlands. Health insurance in the Netherlands. The Hague: Government of the Netherlands, 2011.
22. Tsiachristas A, Hipple-Walters B, Lemmens KM, Nieboer AP, Rutten-van Molken MP. Towards integrated care for chronic conditions: Dutch policy developments to overcome the (financial) barriers. Health Policy. 2011;101(2):122-32.
23. Ministerie van Volksgezondheid, Welzijn en Sport. Besluit van 6 juli 2011 [Decision of 6 July 2011]. Staatsblad van het Koninkrijk der Nederlanden. 2011;366.
24. Pampel FC, Krueger PM, Denney JT. Socioeconomic Disparities in Health Behaviors. Annu Rev Sociol. 2010;36:349-70.
25. Fung V, Schmittdiel JA, Fireman B, Meer A, Thomas S, Smider N, et al. Meaningful variation in performance: a systematic review. Medical Care. 2010;48(2):140-8.
26. Avenell A, Brown TJ, McGee MA, Campbell MK, Grant AM, Broom J, et al. What are the long-term benefits of weight reducing diets in adults? A systematic review of randomized controlled trials. J Hum Nutr Diet. 2004;17(4):317-35.
27. Dansinger ML, Tatsioni A, Wong JB, Chung M, Balk EM. Meta-analysis: the effect of dietary counseling for weight loss. Ann Intern Med. 2007;147(1):41-50.
28. Barratt R, Frost G, Millward DJ, Truby H. A randomised controlled trial investigating the effect of an intensive lifestyle intervention v. standard care in adults with type 2 diabetes immediately after initiating insulin therapy. BrJ Nutr. 2008;99(5):1025-31.
29. Curzio JL, Kennedy SS, Elliott HL, Farish E, Barnes JF, Howie CA, et al. Hypercholesterolaemia in treated hypertensives: a controlled trial of intensive dietary advice. J HypertensSuppl. 1989;7(6):S254-S5.
30. Delahanty LM, Sonnenberg LM, Hayden D, Nathan DM. Clinical and cost outcomes of medical nutrition therapy for hypercholesterolemia: a controlled trial. J AmDietAssoc. 2001;101(9):1012-23.
31. Ramsay LE, Ramsay MH, Hettiarachchi J, Davies DL, Winchester J. Weight reduction in a blood pressure clinic. BrMedJ. 1978;2(6132):244-5.

32. Rhodes KS, Bookstein LC, Aaronson LS, Mercer NM, Orringer CE. Intensive nutrition counseling enhances outcomes of National Cholesterol Education Program dietary therapy. J AmDietAssoc. 1996;96(10):1003-10.
33. Willaing I, Ladelund S, Jorgensen T, Simonsen T, Nielsen LM. Nutritional counselling in primary health care: a randomized comparison of an intervention by general practitioner or dietician. EurJ CardiovascPrevRehabil. 2004;11(6):513-20.
34. Cousins JH, Rubovits DS, Dunn JK, Reeves RS, Ramirez AG, Foreyt JP. Family versus individually oriented intervention for weight loss in Mexican American women. Public Health Rep. 1992;107(5):549-55.
35. Hu G, Tian H, Zhang F, Liu H, Zhang C, Zhang S, et al. Tianjin Gestational Diabetes Mellitus Prevention Program: study design, methods, and 1-year interim report on the feasibility of lifestyle intervention program. Diabetes ResClinPract. 2012;98(3):508-17.
36. Lim HJ, Choi YM, Choue R. Dietary intervention with emphasis on folate intake reduces serum lipids but not plasma homocysteine levels in hyperlipidemic patients. NutrRes. 2008;28(11):767-74.
37. Wolf AM, Conaway MR, Crowther JQ, Hazen KY, J LN, Oneida B, et al. Translating lifestyle intervention to practice in obese patients with type 2 diabetes: Improving Control with Activity and Nutrition (ICAN) study. Diabetes Care. 2004;27(7):1570-6.
38. Adachi M, Yamaoka K, Watanabe M, Nishikawa M, Kobayashi I, Hida E, et al. Effects of lifestyle education program for type 2 diabetes patients in clinics: a cluster randomized controlled trial. BMC Public Health. 2013;13:467.
39. Huang MC, Hsu CC, Wang HS, Shin SJ. Prospective randomized controlled trial to evaluate effectiveness of registered dietitian-led diabetes management on glycemic and diet control in a primary care setting in Taiwan. Diabetes Care. 2010;33(2):233-9.
40. Thompson RL, Summerbell CD, Hooper L, Higgins JP, Little PS, Talbot D, et al. Dietary advice given by a dietitian versus other health professional or self-help resources to reduce blood cholesterol. Cochrane Database Syst Rev. 2003(3):CD001366.
41. Molenaar EA, van Ameijden EJ, Vergouwe Y, Grobbee DE, Numans ME. Effect of nutritional counselling and nutritional plus exercise counselling in

overweight adults: a randomized trial in multidisciplinary primary care practice. FamPract. 2010;27(2):143-50.

42. Neil HA, Roe L, Godlee RJ, Moore JW, Clark GM, Brown J, et al. Randomised trial of lipid lowering dietary advice in general practice: the effects on serum lipids, lipoproteins, and antioxidants. BMJ. 1995;310(6979):569-73.
43. Reid R, Fodor G, Lydon-Hassen K, D'Angelo MS, McCrea J, Bowlby M, et al. Dietary counselling for dyslipidemia in primary care: results of a randomized trial. CanJ DietPractRes. 2002;63(4):169-75.
44. Cade JE, Kirk SF, Nelson P, Hollins L, Deakin T, Greenwood DC, et al. Can peer educators influence healthy eating in people with diabetes? Results of a randomized controlled trial. DiabetMed. 2009;26(10):1048-54.
45. Lok KY, Chan RS, Sea MM, Woo J. Nutritionist's variation in counseling style and the effect on weight change of patients attending a community based lifestyle modification program. Int J Environ Res Public Health. 2010;7(2):413-26.
46. Delahanty LM, Hayden D, Ammerman A, Nathan DM. Medical nutrition therapy for hypercholesterolemia positively affects patient satisfaction and quality of life outcomes. Ann Behav Med. 2002;24(4):269-78.
47. Goodchild CE, Skinner TC, Parkin T. The value of empathy in dietetic consultations. A pilot study to investigate its effect on satisfaction, autonomy and agreement. JHumNutrDiet. 2005;18(3):181-5.
48. Hancock RE, Bonner G, Hollingdale R, Madden AM. 'If you listen to me properly, I feel good': a qualitative examination of patient experiences of dietetic consultations. JHumNutrDiet. 2012;25(3):275-84.

2

Integrating care by implementation of bundled payments: results from a national survey on the experience of Dutch dietitians

Published as:
Tol J, Swinkels IC, Struijs JN, Veenhof C, de Bakker DH. Integrating care by implementation of bundled payments: results from a national survey on the experience of Dutch dietitians. International journal of integrated care. 2013;13:e055.

Abstract

Introduction In the Netherlands, bundled payments were introduced as part of a strategy to redesign chronic care delivery. Under this strategy new entities of healthcare providers in primary care are negotiating with health insurers about the price for a bundle of services for several chronic conditions. This study evaluates the level of involvement of primary healthcare dietitians in these entities and the experienced advantages and disadvantages.

Methods In August 2011, a random sample of 800 Dutch dietitians were invited by email to complete an online questionnaire (net response rate 34%).

Results Two-thirds participated in a diabetes disease management programme, mostly for diabetes care, financed by bundled payments (n=130). Positive experiences of working in these programmes were an increase in: multidisciplinary collaboration (68%), efficiency of healthcare (40%), and transparency of healthcare quality (25%). Negative aspects were: an increase in administrative tasks (61%), absence of payment for patients with comorbidity (38%), and concerns about substitution of care (32%).

Discussion/conclusion Attention is needed for payment of patients with co- or multi-morbidity within the bundled fee. Substitution of dietary care by other disciplines needs to be further examined since it may negatively affect the quality of treatment. Task delegation and substitution of care can require other competencies from dietitians. Further development of coaching and negotiation skills may help dietitians prepare for the future.

Introduction

Many people suffer from chronic non-communicable diseases worldwide [1]. Unhealthy lifestyles, including unhealthy dietary patterns, are among the key risk factors for major chronic non-communicable diseases, such as cardiovascular diseases or diabetes [2]. Therefore, dietary treatment is an important aspect of the prevention and management of various chronic diseases. Increased prevalence of chronic diseases is predicted for the coming years. In line with this increase, there is a growing necessity for coordination of healthcare delivery for the chronically ill [3]. Consequently, health care providers and public policy makers have embraced the concept of disease management.

Disease management programmes were originally developed in the United States, and a range of countries have followed suit [4]. Some studies have shown that disease management programmes in general may contribute to better care for the chronically ill [5, 6]. However, many countries are seeking ways to provide more effective and less expensive care. In the Netherlands, a number of initiatives were introduced to improve the quality and reduce the costs of care for chronically ill patients [7]. The fragmentary nature of the funding of these initiatives, however, hindered the establishment of nationwide, long-term disease management programmes [8, 9]. The Dutch minister of health therefore approved the implementation of a structural, bundled payment approach in 2010 for type 2 diabetes care, chronic obstructive pulmonary disease care, and vascular risk management.

The Dutch bundled payment scheme aims to improve multidisciplinary collaboration and, consequently, to improve healthcare and the affordability of healthcare for patients with chronic diseases [10]. Under the bundled payment schemes, insurers now pay a single fee to a contracting entity, the care group, to cover all of the primary care needed to manage a chronic condition [7, 10]. Care groups are often exclusively owned by general practitioners. The care group assumes both clinical and financial responsibility, often in a particular geographical region, on the basis of bundled payment contracts. A care group either subcontracts other care providers, such as general practitioners, practice nurses, dietitians, and

specialists, or delivers the contracted care itself. The price for the bundle of services is freely negotiable by insurers and care groups, and the fees for the subcontracted care providers are likewise freely negotiable by the care group and providers [9]. Care services by care groups are provided in accordance with Care Standards, which describes the care services and treatment activities (the 'what'), but do not specify the providers (the 'who', 'where' and 'how') of those activities.

Experimentation with bundled payments was first introduced in the United States. Some of the plusses of bundled payments include their potential to improve coordination among multiple caregivers, flexibility in the delivery of care, incentive to reduce costs, and one bill instead of many [11, 12]. In the Netherlands, the first results from a national evaluation of care groups financed by bundled payments showed that this system improved the organization and coordination of care and led to better collaboration among healthcare providers and greater adherence to care protocols. Negative results included dominance of the care group by general practitioners, large price variations in the bundled fee across care groups, and the administrative burden [13].

Up to now, almost all studies examining the effect of the Dutch bundled payment approach have mainly focussed on the role of care groups and the effects of bundled payments on quality of care and healthcare expenditure [14]. Research specifically focusing on the perspectives of subcontracted caregivers is scarce. Only one study was aimed specifically at a subcontracted profession, and included an explorative survey conducted among Dutch physical therapists. The study showed that physical therapists have little reason to participate in disease management programmes financed by bundled payments. Only a small percentage of patients in primary care physical therapy practices need chronic care such as diabetes care, chronic obstructive pulmonary disease care, and vascular risk management. By contrast, for the profession of dietetics, the implementation of bundled payments may have a major impact, since dietitians frequently treat patients with diabetes, chronic obstructive pulmonary disease, or patients with cardiovascular diseases and those at risk for cardiovascular diseases [15].

Prior to the implementation of bundled payments, dietitians were generally negative about the prospect and voiced concerns about substitution of care [16]. They feared, for example, that fewer patients would be referred for dietary advice due to competition from the practice nurse. Substitution of care could occur since the Care Standards include nutritional and dietary advice as an essential component in diabetes management, although the provider, price and volume of care are not specified [17]. This creates negotiation opportunities for dietitians, but it also poses a threat, as dietary advice can also be provided by other competent care providers, such as the general practitioner or practice nurse. A dietitian's participation in disease management programmes is therefore not an absolute given. Similarly, this is also the case in the United States [18] and Canada [19].

In 2011, diabetes care groups covered almost all regions in the Netherlands and almost 90% of diabetes care groups had contracted one or more dietitians [20]. A survey of dietitians, however, found that the percentage involved in a care group was considerably lower (66% in September 2010), and many were not even planning to get involved [21]. This raises questions about dietitians' perceptions of bundled payments. A limitation of that survey was the relatively small sample of dietitians who filled out the questionnaire (response rate 17%), plus the fact that the results were not specified to dietitians working in disease management programmes financed by bundled payments. Therefore, the current study aims to explore dietitians' experience of working in disease management programmes financed by bundled payments. Knowledge about this topic should provide insight for policy makers and dietitians about the pros and cons of a bundled payment scheme in order to operate according to the principles of disease management. Accordingly, an international audience can benefit from the lessons learned, since different payment methods for disease management programmes are frequently under discussion [11]. See Box 1 for more information about the organization and payment system of dietetics in the Netherlands.

To summarise, the research questions of this exploratory study are: 1) To what extent are Dutch primary healthcare dietitians involved in disease

management programmes financed through bundled payments? 2) What are the experiences and opinions of Dutch primary healthcare dietitians with regard to working in disease management programmes financed through bundled payments?

Box 1: General description of education, working field and remuneration of dietitians in the Netherlands.

Education:

- Dietitians hold a Bachelor's degree. The professional title is registered, meaning that it can only be used by people who have been given permission to use it. The dietetics occupational group is relatively small, i.e. the number of registered dietitians in the Netherlands was 14 per 100.000 inhabitants in the year 2011[22, 23]. Almost all Dutch dietitians are female.

Working field:

- Dietitians work in a wide variety of settings. In January 2011, about 55% of all dietitians work in primary health care (i.e. private practice or home care), 35% in secondary care, i.e. hospital care or nursing homes, 3% in tertiary care (e.g. institution for the intellectually disabled), 7% other (e.g. commercial organizations, or teaching capacity) [24].

Remuneration – since 2006:

- Since 2006, dietetic treatment was remunerated by the basic insurance coverage for up to four hours per calendar year, under the condition that the patient had a medical indication and was referred by a physician. This remuneration was fee-for-services based.
- Remuneration included both the direct treatment time, i.e. the total time of the consultation with the patient, and the indirect treatment time, i.e. the time the dietitian needs to administer and prepare the patient's consultation.
- Extra remuneration for dietetic care was included by some additional insurance policies.

Remuneration – since the implementation of bundled payments in 2010:

- In cases where the patient received care from a disease management program, the dietitian could purchase the dietetic care that was contracted within the care group by the system of bundled payments.
- Dietetic care could alternatively still be claimed under the 'regular' pricing system, i.e. declaration based on delivered care (see bullet remuneration – since 2006).

Remuneration – in 2012:

- January 1st 2012, remuneration of dietetic treatment had changed. Dietetic treatment was remunerated by the basic insurance coverage for up to four hours per calendar year, under the condition that the patient received interdisciplinary coordinated care for treatment of diabetes mellitus type 2, chronic obstructive pulmonary disease or vascular risk management [25].
- This remuneration supported bundled payments. In cases where the patient received care from a disease management program, the dietitian could only purchase the dietetic care that was contracted within the care group by the system of bundled payments. In some other cases where the conditions for reimbursement were met, the dietitian or patient could get the delivered care reimbursed directly from the insurer.

Remuneration – in 2013:

- In 2013, remuneration of dietetic treatment had changed again. Now, dietetic treatment was remunerated by the basic insurance coverage for up to a maximum of three hours per calendar year. In cases where the patient received care from a disease management program, the dietitian could purchase the dietetic care that was contracted within the care group by the system of bundled payments.

Subjects and methods

Participants

For the purpose of this explorative study 800 dietitians were randomly selected from a membership list containing all e-mail addresses of the members of the Dutch Dietetic Association. The 800 dietitians represented 65% of all primary care dietitians [23]. Only dietitians working in primary health care were eligible to participate. Dietitians who were not actively practising in the Netherlands were excluded.

Questionnaire

Data were collected through an online survey in August 2011. The participants received an e-mail with a covering letter describing the aims of the study and containing a personal html-link with log-in password in order to complete the questionnaire online. Non-respondents were sent a reminder e-mail after three weeks, and a second reminder after a further three weeks. To increase the response, three raffle-type draws for a 50 euro gift voucher were held.

The questionnaire was based on a previously designed questionnaire measuring the involvement of Dutch physical therapists in disease management programmes financed by bundled payments. The latter questionnaire had been based on a literature search and semi-structured interviews with experts in the field of bundled payments. For the current questionnaire, topics were extended and adjusted to include issues that were relevant for the dietetic profession. The authors of this study developed the questionnaire. Subsequently, the questionnaire was reviewed by experts of the Dutch Dietetic Association as well as the same bundled payment experts who had previously been involved in the development of the questionnaire for physical therapists. The first part of the questionnaire collected general information on respondents' age, gender, years of experience, work setting and region of employment. The second part of the questionnaire collected information on dietitians' involvement in disease management programmes financed through bundled payments, and their experiences and opinions with regard to working in programmes of this nature (see Table 1).

Table 1: Content of the questionnaire

Question	Answer category
1. Are you participating in a disease management programme?	*Single choice:* a) yes *(continue to question 2);* b) no.
1a. What are the main reasons that you are not participating in a disease management programme?	*More than one answer possible (max three):* a) there are no initiatives in the region; b) I have not been approached by a care group; c) I do not feel the need to participate in a disease management programme; d) I do not meet the care group's requirements; e) I do not agree with the terms and conditions for participating; f) I expect too much loss of autonomy concerning treatments; g) the costs associated with participating in disease management programmes are too high; h) the care group already has a dietitian; i) the care group did not intend to include a dietitian; j) I don't know; k) other, namely… *(go to end of questionnaire)*
2. In what disease management programme are you participating?	*More than one answer possible:* a) chronic obstructive pulmonary disease; b) vascular risk management; c) diabetes mellitus type 2; *(continue to question 3 if one answer is given)*
2a. You responded that you are working in multiple disease management programmes. Please complete the next questions, bearing in mind the disease management programme in which you are treating most patients. In what disease management programme are you	*Single choice:* a) chronic obstructive pulmonary disease; b) vascular risk management; c) diabetes mellitus type 2.

treating most of your patients?

3) Did you get a contract from the care group for participating in the disease management programme?	*Single choice:* a) yes; b) no *(continue to question 4).*
3a) How was the contracting process arranged in your region?	*Single choice:* a) all dietitians in a region were individually contracted; b) the care group closes a deal with a couple of dietitians; c) the care group exclusively contracts home care organizations; d) the care group exclusively contracts large primary care organizations; e) the care group exclusively contracts dietitians who are part of a regional association; f) I don't know.
4) What are your main tasks in the disease management programme?	*More than one answer possible (max three):* a) giving individual medical nutrition therapy; b) giving group dietary treatments; c) giving individual education; d) giving group education; e) coaching the practice nurse; f) developing materials; g) governance tasks; h) management tasks; i) other tasks, namely…
5) How do you get paid for providing care to patients in the disease management programme?	*Single choice:* a) via the care group, i.e. bundled payments; b) by the insurer under basic health insurance cover; c) both; d) I don't know; e) other, namely…
6) Do you have to cope with double registration of information in your usual electronic health records and in the electronic health records used by the care group?	*Single choice:* a) yes b) no *(continue to question 7).*

6a) What type of information was double registered?	*More than one answer possible:* a) payment information; b) personal information; c) measurements; d) appointments; e) other information, namely…
7) Did your relationship with the general practitioner change because of collaborating in the disease management programme?	*Single choice:* a) yes; b) no *(continue to question 8).*
7a) How did the relationship change?	*More than one answer possible (max three):* a) more equal relationship; b) easier access to the GP; c) easier access to the practice nurse; d) increase in contact frequency initiated by the GP; e) increase in contact frequency initiated by the practice nurse; f) increase in number of meetings about patients' treatment; g) increase in number of meetings about other tasks; h) stronger position of the (practice of the) GP; i) more difficult access to the GP; j) decrease in contact frequency initiated by the GP; k) decrease in contact frequency initiated by the practice nurse; l) decrease in number of meetings about patients' treatment; m) decrease in number of meetings about other tasks; n) other reason, namely…
8) Please mention the main advantages of working in disease management programmes financed through bundled payments	*More than one answer possible (max three):* a) increased transparency of healthcare quality; b) increased quality of healthcare; c) increased collaboration between dietitians; d) increased multidisciplinary collaboration; e) increased efficiency in primary healthcare; f) increase in structured treatments according to healthcare standards;

	g) increase in dietitians' income; h) better IT-applications; i) solution to the fragmented funding of care; j) substitution of tasks from secondary to primary care; k) substitution of patients from secondary to primary care; l) other advantage, namely…
9) Please mention the main disadvantages of working in disease management programmes financed by bundled payments	*More than one answer possible (max three):* a) decreased quality of healthcare; b) decreased collaboration between dietitians; c) dietetic care was substituted by other disciplines; d) reduction in dietitian's income; e) reduction in patients' freedom of care provider; f) reduction in number of referred patients; g) little or no freedom of choice in method of treatment; h) treatment of co-morbidities does not fit within the system of bundled payments; i) increase in administrative tasks; j) insufficient opportunities for negotiation(s); k) other disadvantage, namely…
10) To what extent do you agree with the following statement: Substitution of dietetic care is happening?	Single choice: a) completely disagree; b) disagree; c) neutral; d) agree; e) completely agree.

Statistical analyses

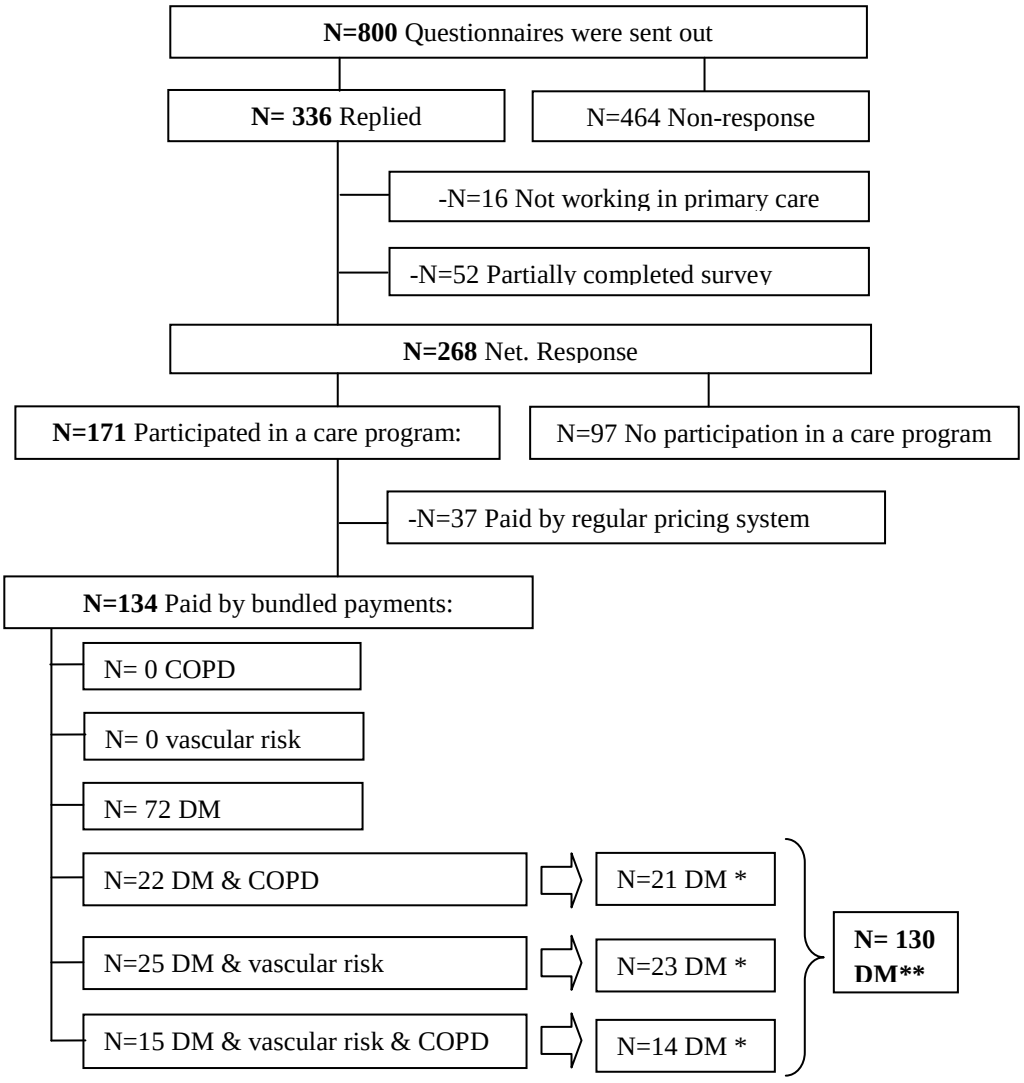
We performed descriptive statistical analyses to investigate the involvement, experiences and opinions of dietitians regarding disease management programmes financed by bundled payments. Data on non-respondents were not available. However, to investigate the generalizability of the results, statistical analyses were conducted to test for a significant difference ($p<0.05$) between the general characteristics of the respondents compared to the primary health care dietitians who were member of the Dutch Dietetic Association. An independent samples t-test was used to examine mean differences in age and number of years of professional experience between the two groups. Chi-squared tests were used to determine if significant differences in gender and regional distribution existed between the two groups. Missing data were not included; the data were analysed using STATA version 11.

Results

Response and general information

Of the 800 dietitians surveyed, 336 (42%) dietitians responded, of whom 320 were eligible to participate. 16 respondents did not work as a dietitian in primary health care. A total of 268 (net response rate 34%) dietitians completed the entire questionnaire (see Figure 1). The majority worked in private practice (69%). The respondents were representative to all members of the Dutch Dietetic Association for years of work experience (average 16 years, $p=0.96$), gender (98% were female, $p=0.82$) and region of residence ($p=0.08$). However, the respondents were significantly older compared to all members of the Dutch dietetic association, with a mean age of 42.5 versus 40.0 ($p<0.01$).

Figure 1: Response and involvement in disease management programmes



Footnotes Figure 1

* The dietitians who participated in more than one disease management programme financed by the system of bundled payments were asked to complete the questionnaire regarding the care group where they treated most of their patients. Most patients were treated in a diabetes care programme.

** Results were shown for dietitians who participated in a diabetes disease management programme financed by bundled payments.

Involvement in disease management programmes financed by bundled payments

Two-third of the 268 respondents participated in at least one of the three disease management programmes (n=171) (See Figure 1). Excluded from this study were results from dietitians who participated in a disease management programme where dietetic care was exclusively financed by the "regular" pricing system (n=37), i.e. dietitians claimed for the delivered care directly from the insurance companies. The majority of dietitians participated in a disease management programme financed by bundled payment schemes, i.e. dietitians were paid by the care group or a combination of the care group and the "regular" pricing system (n=134). Almost half of the dietitians participated in more than one disease management programme financed by bundled payment schemes (46% of 134). Overall, most of their patients were treated in a disease management programme for diabetes type 2 (n= 130). Therefore, the results for vascular risk management and chronic obstructive pulmonary disease care were not taken into account.

Almost all dietitians who participated in a bundled payment disease management programme on diabetes were subcontracted by the care group (95% of 130). Most of the time, the dietitians in a region were individually contracted (67% of 124). Some dietitians reported that care groups limited the number of dietitians eligible to participate (10% of 124). The main reported reasons for not participating in a disease management programme were: 1) a lack of initiatives in the region (32% of 97), and 2) not being approached by a care group (27% of 97). Only a limited number of dietitians (12% of 97) were unable to participate because the care group did not intend to subcontract a dietitian.

The main tasks of the dietitian in a diabetes disease management programme were to provide individual medical nutrition therapy (91%) and individual education (35%). About a third of the dietitians were also contracted to coach the practice nurse regarding dietary counselling. Less than five percent of the dietitians were involved in management and/or governance tasks.

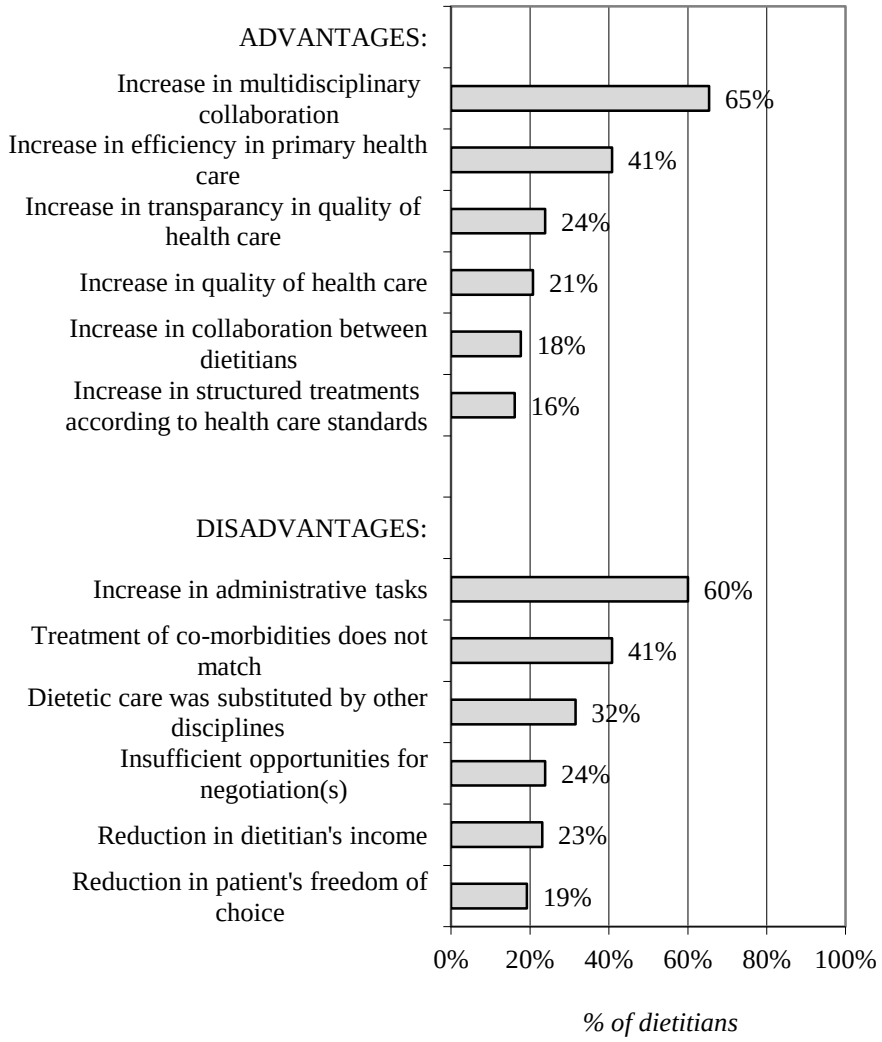
Advantages

An increase in multidisciplinary collaboration (65% of 130) was one of the three most frequently mentioned advantages of working in a bundled payment disease management programme. For example, one out of three dietitians (n=47) mentioned that the relationship with the general practitioner had changed, usually in a positive manner. Three frequently cited changes were: easier access to the practice nurse (70.2% of 47), increased contact frequency initiated by the practice nurse (66% of 47), increased number of meetings with the general practitioner about patients' treatment (49% of 47). The second and third most frequently mentioned advantages were more efficiency in primary healthcare (41%) and greater transparency of healthcare quality (24%) (See Figure 2).

Disadvantages

The most frequently mentioned disadvantage of the bundled payment scheme was an increase in administrative tasks (60%). For example, 60% of dietitians had to cope with double registration information in their usual electronic health record and in the electronic health record used by the care group. The majority of dietitians registered double information for personal details (68% of 78), appointments (65% of 78), measurements (63% of 78), and payments (59% of 78). The second and third most frequently mentioned disadvantages were a lack of payment for patients with co- or multi-morbidity (41%), and that dietetic care was substituted by other disciplines (32%). The majority of dietitians (fully) believed that substitution of dietetic care was happening (55%), though 31% did not have an opinion about this issue.

Figure 2: Six most frequently cited advantages and disadvantages of bundled payments (maximum of three answers per dietitian, *n*=130)



Discussion

Almost two years after the introduction of the bundled payment scheme, two-thirds of Dutch primary healthcare dietitians participated in a disease management programme. The majority were subcontracted by a care group to deliver medical nutrition therapy in a diabetes disease management programme financed by bundled payments. Both positive and negative aspects of the bundled payment scheme were reported by the dietitians.

Regarding the involvement of dietitians in disease management programmes, the results seem comparable with the findings of a study one year earlier [21]. The absence of an increase was not related to a lack of willingness among dietitians to participate. The most frequently mentioned reason for not participating in a care group was a lack of initiatives in the region. However, in 2011, diabetes care groups were represented in all regions in the Netherlands [20]. Comparing the regional distribution of dietitians with the regional coverage of diabetes disease management programmes (results not shown), it seems unlikely that there were no programmes in any respondent's region of residence. Therefore, the awareness of the existence of care groups in the region should be promoted among relatively small professional healthcare disciplines, in this case dietetics. Another frequently mentioned reason for not participating was not being approached by a care group. However, dietitians themselves could take the initiative in this respect. Few dietitians were unable to participate because the care group did not intend to include a dietitian. Therefore, watchfulness is needed, since excluding dietitians from care groups may result in decreased access to dietetic care for patients within diabetes care groups, with limited freedom of choice as result [25].

Dietitians who participated in a disease management programme on diabetes most frequently reported increased multidisciplinary collaboration as an important advantage of bundled payments. This was consistent with results from the national evaluation of Dutch care groups [13]. Although greater efficiency of healthcare and transparency of healthcare quality are among the most frequently reported advantages of care groups, only a minority of dietitians mentioned these as an advantage. Therefore, improvements would

seem necessary. A lack of transparency in the quality of delivered care is a major problem for dietitians, as the care services provided by the dietitian can be substituted by other disciplines in the bundled payment model. Transparency can be improved in the future by promoting the development and implementation of electronic health records. For example, registered data on the dates and time of treatment visits, treatment process and performance indicators could be used for negotiations with care groups. The most frequently mentioned negative aspect of the bundled payment scheme was an increase in administrative tasks as a consequence of the necessity of registering the same data in multiple IT-applications. All providers register data in their own electronic health records but are also obliged to register these data in the care group's electronic health records. As a consequence of the lack of an adequate integration of the IT-applications, the administrative burden of subcontracted caregivers has increased. However, these record-keeping obligations have also led to a reported advantage, namely increased transparency of the quality of care delivered. Therefore, the integration of the different electronic health records needs to be fostered in order to support the electronic registration and payment system for patient care within a care group.

The second most important disadvantage was a lack of payment for patients with co- or multi-morbidity within the bundled fee. This problem occurs as the bundled payment scheme has a single-disease focus, meaning that only care services for diabetes were included in the bundled fee and no services related to coexisting conditions. This is despite the fact that 90% of the patients with diabetes who visit a dietitian have coexisting conditions [26]. Working with single-disease bundled payments for specific chronic conditions might result in a compartmentalized health care delivery system for patients with co- or multi-morbidity. A global payment approach could be a solution to this problem. Recently, the Dutch minister of health announced new payment reforms which might include this global payment approach [27]. Under the proposed reforms, care groups would receive a specified amount of money per enrolled resident based on the characteristics of the population. In principle, it will address all required healthcare for an assigned population, financed by a single amount per assigned citizen.

Bundled payments can therefore be seen as an intermediate step towards the delivery of real integrated care with an global payment approach as the ultimate goal [25].

Another important disadvantage for the dietitian was that dietetic care was substituted by other disciplines, such as the practice nurse. The majority of dietitians (fully) believed that substitution of dietetic care was taken place. An evaluation study by Van Dijk et al. showed similar results for substitution of dietetic healthcare [28]. In general, task delegation and substitution of care was encouraged by care groups, and was aimed at reducing health care costs and improving the efficiency of diabetic care [29]. Task delegation and substitution of care may have consequences for dietitians. Negative effects may include a reduction in their income. Positive effects may include an involvement in disease management programmes. These may consist of coaching and training the practice nurse to give general dietary advice, and giving dietary advice to patients with more complex health problems. Task delegation and substitution of care can require other competencies from dietitians, such as coaching skills, and negotiation skills to obtain a proper contract. Dietitians could prepare themselves for the future by developing these skills. Recently, a nutrition care module was published which provides insight into the different types of nutritional care and the requirements for the delivery of adequate nutritional care by caregivers with the right competencies [25]. Dietitians can actively use this module for negotiations, supplementary to the Care Standards. Consequently, the question remains whether task delegation and substitution of dietetic care may negatively affect the quality of treatment. There is no strong evidence demonstrating that treatment by a dietitian achieves better outcomes than treatment by practice nurses [30, 31]. Therefore, research is needed to evaluate the effectiveness of dietetic treatment and the impact of substitution of dietary counselling by other disciplines.

A strength of the study was the accessibility of the questionnaire, enabled by the fact that the majority of Dutch primary healthcare dietitians (65% of total) were approached by e-mail with a covering letter and a personal html-link with a view to filling out the questionnaire online. Another strength was

the response rate obtained. Even though the response rate seems relatively low, this study surveyed 20% of all Dutch primary care dietitians. In addition, the response rate was twice as high as compared to a survey conducted among dietitians [21] and was comparable with the response rates of a survey conducted among physical therapists. A limitation of our study was the establishment of the respondent's representativeness. No information was available on non-respondents. It is possible that dietitians without experience of bundled payments or of care groups may not have felt drawn to participating. We do not believe that this has led to an overestimation of the number of dietitians participating in care programmes, since the results were comparable to those from one year earlier [21]. In addition, the respondents were representative for number of years worked, gender and regional distribution compared to the members of the Dutch association of Dietetics.

Conclusion

Almost two years after the introduction of the bundled payment scheme, two-thirds of Dutch primary healthcare dietitians participated in a disease management programme. The majority were subcontracted to deliver medical nutrition therapy in a disease management programme for diabetes type two financed by bundled payments. Both positive and negative aspects were reported Positive aspects were an increase in: multidisciplinary collaboration, efficiency of healthcare, and transparency in quality of care delivered. Negative reported aspects were: an increase in administrative tasks as a consequence of double reporting, absence of payment for patients with co- and multi-morbidity and concerns about care substitution. The effect of substitution of dietary counselling by other disciplines needs to be further examined since it may negatively affect the quality of treatment. Furthermore, task delegation and substitution of care can require other competencies from dietitians. For this reason, they could prepare themselves for the future by developing their coaching and negotiation skills.

References

1. World Health Organization. The global burden of disease. Geneva: WHO, 2004.
2. World Health Organization. Diet, Nutrition and the prevention of chronic diseases. Geneva: WHO, 2003.
3. Bodenheimer T. Coordinating care--a perilous journey through the health care system. N Engl J Med. 2008;358(10):1064-71.
4. Gress S, Baan CA, Calnan M, Dedeu T, Groenewegen P, Howson H, et al. Co-ordination and management of chronic conditions in Europe: the role of primary care--position paper of the European Forum for Primary Care. Qual Prim Care. 2009;17(1):75-86.
5. Drewes HW, Boom JHC, Graafmans WC, Struijs JN, Baan CA. Effectiviteit van disease management. Een overzicht van de (internationale) literatuur [Effectiveness of disease management. An overview of the international literature]. Bilthoven: RIVM, 2008.
6. Velasco-Garrido M, Busse R, Hisashige A. Are disease management programmes (DMPs) effective in improving quality of care for people with chronic conditions? Copenhagen: WHO Regional Office for Europe; 2003 [cited August 5, 2013]. Available from: http://www.euro.who.int/document/e82974.pdf .
7. Tsiachristas A, Hipple-Walters B, Lemmens KM, Nieboer AP, Rutten-van Molken MP. Towards integrated care for chronic conditions: Dutch policy developments to overcome the (financial) barriers. Health Policy. 2011;101(2):122-32.
8. Struijs JN, van Til JT, CA B. Experimenting with a bundled payment system for diabetes care in the Netherlands - The first tangible effects. Bilthoven: RIVM, 2010.
9. Struijs JN, Baan CA. Integrating care through bundled payments--lessons from The Netherlands. N Engl J Med. 2011;364(11):990-1.
10. Ministerie van Volksgezondheid, Welzijn en Sport. De patiënt centraal door omslag naar functionele bekostiging [Patient-central care by changing to bundled payments]. Den Haag: VWS, 2008.
11. Miller HD. From volume to value: better ways to pay for health care. Health Aff (Millwood). 2009;28(5):1418-28.

12. Silversmith J. Five payment models: the pros, the cons, the potential. Minn Med. 2011;94(2):45-8.
13. de Bakker DH, Struijs JN, Baan CB, Raams J, de Wildt JE, Vrijhoef HJ, et al. Early results from adoption of bundled payment for diabetes care in the Netherlands show improvement in care coordination. Health Aff (Millwood). 2012;31(2):426-33.
14. Struijs JN, de Jong-van Til JT, Lemmens LC, Drewes HW, de Bruin SR, Baan CA. Three years of bundled payment for diabetes care in the Netherlands – Impact on health care delivery process and the quality of care. Bilthoven: RIVM, 2012.
15. Tol J, Valentijn KJM, Swinkels ICS, Veenhof C. Jaarcijfers en trendcijfers 2008 - 2011 dietetiek, gegevensverzameling binnen vrijgevestigde praktijken voor dietetiek [Annual statistics and trends 2008 – 2011 dietetics, data collection on dietitians working in private practices in primary health care]. Utrecht: NIVEL, 2012.
16. Tol J, Swinkels ICS, Leemrijse CJ, Schoenmakers EH, Veenhof C. Wat vinden diëtisten van integrale bekostiging en van directe toegang diëtetiek [What do dietitians think about bundled payments and direct access to dietetics]? Utrecht: NIVEL, 2010.
17. Nederlandse Diabetes Federatie. Care standards - Transparency and quality of diabetes care for people with type 2 diabetes Amersfoort: NDF; 2007 [cited 2012 5 August]. Available from: http://www.diabetesfederatie.nl/start/zorgstandaard/diabetes-care-standard/index.php?option=com_docman&task=cat_view&gid=37&Itemid=1&mosmsg=You+are+trying+to+access+from+a+non-authorized+domain.+%28www.google.nl%29 .
18. Ringland J. Delegate Report - Interdisciplinary teams: American Dietetic Association; 2011 [cited 2012 27 January]. Available from: http://eatrightri.org/legislative/interdisciplinary_teams.pdf .
19. Brauer PM, Dietrich L. Adding a registered dietitian to your team? : Dietitians of Canada; 2006 [cited 2013 13 August]. Available from: http://www.dietitians.ca/Downloadable-Content/Public/Adding-Dietitian-to-your-Team.aspx .
20. de Jong-van Til TJ, Lemmens LC, Baan CA, Struijs JN. De organisatie van zorggroepen anno 2011: Huidige stand van zaken en de ontwikkelingen in de

afgelopen jaren [Organization of care groups in 2011: Current matters and developments over the last years]. Bilthoven: RIVM, 2012.

21. Bakker N. Diëtisten in zorggroepen. Verslag van de enquête gehouden in september 2010 [Dietitians in care groups. Report of the survey from September 2010]. NVD Nieuws. 2010;12(8):8-9.
22. Statistics Netherlands. Main indicators of the Netherlands. [cited January 27, 2012]. Available from: http://www.cbs.nl/en-GB/menu/cijfers/default.htm .
23. Nederlandse Vereniging van Diëtisten. Statistieken NVD [Statistics of the Dutch Dietetic Association]. Houten: NVD; 2012 [cited January 27, 2012]. Available from: http://www.nvdietist.nl/content.asp?kid=10529458 .
24. Ministerie van Volksgezondheid, Welzijn en Sport. Beantwoording vragen AO Zorgverzekeringswet/pakketadvies 2011 [General meeting answers to questions regarding health insurance act/package advice 2011]. Den Haag: VWS, 2011.
25. de Bakker DH, de Raams J, Schut E, Vrijhoef B, de Wildt JE. Integrale bekostiging van zorg: werk in uitvoering. Eindrapport van de Evaluatiecommissie Integrale Bekostiging [Integrated care through bundled payments: work in progress. End report of the evaluation committee bundled payments]. The Hague: ZonMW, 2012.
26. Valentijn KJM, Tol J, Leemrijse CJ, Swinkels ICS, Veenhof C. De behandeling van cliënten met diabetes mellitus door vrijgevestigde diëtisten [Dietetic treatment for patients with diabetes mellitus]. Utrecht: NIVEL, 2013.
27. Ministerie van Volksgezondheid, Welzijn en Sport. Proeftuinen en pilots ‘betere zorg met minder kosten' [Experiments and pilots ‘better health care at lower costs’]. Den Haag: VWS, 2013.
28. Van Dijk CE, Korevaar JC. Integrale bekostiging: eerste ervaringen na één jaar invoering [Integrated care: First experiences after one year of implementation]. Utrecht: NIVEL, 2011.
29. Struijs JN, Mohnen SM, Molema CCM, de Jong-van Til JT, Baan CA. Effect van integrale bekostiging op curatieve zorgkosten. Een analyse voor diabeteszorg en vasculair risicomanagement op basis van registratiebestanden Vektis, 2007-2010 [The effects of bundled payments on curative health care costs. An analysis of diabetes care and vascular risk management using Vektis insurance claim data, 2007-2010]. Bilthoven: RIVM, 2012.

30. Funnell MM, Brown TL, Childs BP, Haas LB, Hosey GM, Jensen B, et al. National standards for diabetes self-management education. Diabetes Care. 2012;35 Suppl 1:S101-8.
31. Norris SL, Lau J, Smith SJ, Schmid CH, Engelgau MM. Self-management education for adults with type 2 diabetes: a meta-analysis of the effect on glycemic control. Diabetes Care. 2002;25(7):1159-71.

3

Dutch General Practitioners' weight management policy for overweight and obese patients

Published as:
Kloek CJJ, Tol J, Veenhof C, van der Wulp I, Swinkels ICS. Dutch General Practitioners' weight management policy for overweight and obese patients. BMC Obesity. 2014;1(2).

Abstract

Background General practitioners (GPs) can play an important role in both the prevention and management of overweight and obesity. Current general practice guidelines in the Netherlands allow room for GPs to execute their own weight management policy.

Objective To examine GPs' current weight management policy and the factors associated with this policy.

Methods 800 Dutch GPs were asked to complete a questionnaire in December 2012. The questionnaire items were based on the Dutch Obesity Standard for GPs. The data were analyzed by means of descriptive statistics and multiple linear regression analyses in 2013.

Results In total, 307 GPs (39.0%) responded. Most respondents (82.9%) considered weight management as part of their responsibility for providing care. GPs aged <48 years discussed weight less frequent. Next, weight is less frequently discussed with patients without weight-related comorbidities or with moderately overweight patients compared to obese patients. On average, 47.7% of the GPs reported to refer obese patients to a weight management professional, preferably a dietitian (98.3%). GPs with a BMI≥25 kg/m² were less likely to refer obese patients. In addition, GPs who had frequent contact with a dietitian were more likely to refer obese patients.

Conclusion In the context of General Practice and preventive medicine, GPs' discussion of weight and the variety of obesity-determinants with their moderately overweight patients deserves more attention, especially from younger GPs. Strengthening interdisciplinary collaboration between GPs and dietitians could increase the referral percentage for dietary treatment.

Introduction

Overweight and obesity constitute a global problem, denoted by the World Health Organization (WHO) as "globesity". In 2008, 35% of the adults worldwide were overweight, defined as a Body Mass Index (BMI) of 25.0-30.0 kg/m² and additionally 12% of the adults were obese, defined as a BMI≥30.0 kg/m² [1]. The number of people with overweight and obesity has increased rapidly in recent decades. In the Netherlands alone, the prevalence of adults with overweight increased from 28.2% to 36.8% between 1981 and 2011. In addition, the prevalence of obesity doubled from 5.3% to 11.4% during the same period [2]. Without preventive action it is estimated that overweight and obesity in the Netherlands may affect two thirds of the adult population by 2024 [3]. As a consequence, Dutch healthcare costs directly related to overweight and obesity are substantial [4]. Overweight and obesity are important risk factors for chronic diseases like Type 2 Diabetes Mellitus, cardiovascular diseases, different types of cancer (endometrial, breast, colon) osteoarthritis [5] and are related to poorer quality of life [6]. In addition, obesity is significantly associated with major depressive disorders and anxiety disorders [7].

As gatekeepers in the Dutch health care system, General Practitioners (GPs) can play an important role in both the prevention and management of overweight and obesity. Nearly 80% of all Dutch citizens visit their GP at least once a year [8]. People with obesity consult their GP more often than those without obesity [9]. Guidelines for GPs' weight management policy are outlined in the Obesity Standard of the Dutch College of General Practitioners (NHG). Diagnostics and treatment are indicated for patients with a BMI≥25.0 kg/m², weight-related comorbidities or increased cardiovascular risks. For overweight patients with an excessive waist circumference, diagnostics and treatment are only indicated if weight is the patient's reason for consultation. Treatment may consist of counseling about nutrition, physical exercise, motivation, and discussion about environmental influences, psychosocial problems and weight-related health risks [10]. Referral to other health care providers (i.e. dietitian or nurse practitioner) is indicated in the following situations: if requested by the patient, if underlying causes such as psychological problems are suspected, if previous

attempts to lose weight have failed or if the patient needs comprehensive support [10].

Previous studies have shown that GPs intervene in terms of diagnostics and treatment in only half of the patients with obesity, but specific information about The Netherlands is missing [11, 12]. Barriers among GPs to discussing weight with their patients were a lack of time, insufficient knowledge, inadequate skills, lack of confidence and insufficient motivation among patients [13-20]. Female doctors were more likely to deliver weight-related counseling and were more prevention orientated in obesity management compared to their male colleagues [21]. Also GPs' age has been shown to be related to their attitude regarding weight management policy, although results are inconsistent [22, 23]. Finally, GPs who themselves were conscious of their personal diet, appeared to calculate patients' BMI more frequently [14].

With regard to the referral percentage of patients with obesity for nutrition and/or dietary advice, previous studies have reported a relationship with GPs' attitude toward other health care providers. Mathus-Vliegen et al. reported that because of some GPs' negative attitude to dietitians, they often do not refer patients with obesity to these health care providers [24]. Moreover, problems with interdisciplinary communication impede GPs from referring overweight and obese patients [17, 24, 25]. Costs involved with dietary treatment were cited as a further inhibiting factor in referring patients to other health care providers for nutrition and/or dietary advice [26].

Clearly, the increasing prevalence and the seriousness of overweight and obesity highlight the necessity for solutions. Because of their central role in primary care, GPs are regarded as the principal health care providers in the management of overweight and obesity. Although guidelines for weight management are contained in the NHG Obesity Standard, there is a lack of information about GPs' weight management policy in daily practice. Multiple factors have been found to be associated with GPs' weight management policy, however there may be other influencing factors related to the GP, which may be informative in improving weight related referral

rates. New in this study is the combination of the survey of GPs' current weight management policy and the analysis of the factors associated with this policy. The objective of the present study is to explore GPs' policy on the management of overweight and obesity as well as factors associated with this policy.

Methods

Design and study population

This study was conducted in a cross-sectional design. A random sample of 800 registered Dutch GPs representative of gender, age, type of employment, type of practice and degree of urbanicity were invited to participate. The GPs were recruited from the national register database for primary health care providers of the Dutch Institute for Health Services Research (NIVEL) [27]. Those working as temporary employees were excluded from the study. According to the Dutch Medical Research Involving Human Subjects Act this study did not require ethics approval.

Data collection

The data were collected by means of a questionnaire measuring GPs' weight management policy. For the purpose of this study several questions were developed and included in a larger postal survey. The complete questionnaire included 26 questions (12 were used for the current study, see Appendix 1). The 26 questionnaire items (Appendix 1) were based on the National Obesity Standard for GPs [10]. The items were measured on either a ratio, ordinal or nominal level. The questionnaire comprised two sections of which the first included general questions with regard to overweight and obesity. The second section focused on patients with obesity solely, because an intervention is always indicated for these patients [10]. Nine researchers provided reviews on the scope, length and comprehensibility of the questionnaire. After these expert evaluations, minor modifications were made. The questionnaire was sent by post in December 2012 and took approximately 10 minutes to complete. A reminder was sent in January 2013.

Statistical Analysis

Data analysis was performed using Stata version 12 (StataCorp LP, College Station, Texas, USA) in 2013. The results were processed anonymously. Based on the NIVEL database, general details were available on the GPs who did not participate. Non-response analyses were performed by using t-tests and Chi-squared tests. Missing values were excluded in the analyses. The answer "do not know" was treated as a missing value. Assumptions of statistical techniques were checked.

GPs' policy on managing overweight and obesity was determined by means of descriptive statistics on questionnaire items 1, 2, 3, 4 and 10 (Appendix 1). The frequency of discussing weight was determined by adding up the respondents' answers on item 2 (7 sub-items, 4-point scaled) of the questionnaire. The possibility of merging these 7 different sub-items was investigated by using the Spearman correlation test and a calculated Cronbach's alpha. Items with $-0.80 < r < 0.80$ were merged, as these item associations were considered (fairly) strong. Likewise, a Cronbach's alpha score of >0.70 was considered as good internal consistency [28]. The generated sum score for "discussing weight" ranged from 7 to 28 points, where higher scores indicated that GPs more often discussed weight with their patients.

Characteristics associated with GPs' policy, i.e. the dependent variables, discussing weight sum score and referral percentage for nutrition and/or dietary advice, were analyzed univariately in separate analyses, by means of t-tests and Chi-squared tests. Independent variables were GPs' gender, age, type of employment, BMI, vision about duties of care, perception of other health care providers' suitability for weight management, frequency of contact with a dietitian, type of practice and degree of urbanicity. Independent variables with $p<0.15$ in univariate analyses were included in a multiple linear regression model. In the case of absence of linearity between the independent and dependent variables, 5-point scaled items were transformed into 3-point scaled items. In the case of linearity, continuous variables were centered to the mean for better interpretation. In multivariable analysis a, $p<0.05$ was considered as statistically significant.

Results

Respondents and non-respondents

Of the 800 questionnaires distributed, 12 were returned because of incorrect addressing or because the GPs appeared to be retired. From the final sample of 788 GPs, the net response rate was 39.0% (N=307). Table 1 presents the characteristics of those who participated in the survey compared to the non-respondents. Non-response analyses showed no statistically significant differences between respondents and non-respondents. Table 2 shows the results of the questionnaire. On average, GPs' BMI appeared to be 23.5 kg/m2 (SD 2.6; min-max: 17.4-31.7 kg/m2). Nearly a quarter (24.9%) of the GPs were overweight.

Table 1: General characteristics of respondents and non-respondents

	Respondents N=307 (39.0%)	**Non-Respondents N=481 (61.0%)**	***P*-value**
Gender[a]			0.93
Male	142 (51.4%)	246 (51.1%)	
Female	134 (48,6%)	235 (48.9%)	
Age			0.63
Mean	48.3 (SD 9.2)	47.9 (SD 8.8)	
<40	71 (23.1%)	100 (20.8%)	
40 - 49	91 (29.7%)	164 (34.1%)	
≥50	145 (47.2%)	217 (45.1%)	
Type of employment[a]			0.09
Private	226 (81.9%)	416 (86.5%)	
Salaried	50 (18.1%)	65 (13.5%)	
Type of practice			0.45
Solo	60 (19.5%)	90 (18.7%)	
Dual	119 (38.8%)	208 (43.2%)	
Group	128 (41.7%)	183 (38.1%)	
Urbanicity[b]			0.31
Urban	158 (51.5%)	158 (46.4%)	
Suburban	56 (18.2%)	56 (18.5%)	
Rural	93 (30.3%)	93 (35.1%)	

a N=276 Respondents

b Urbanicity: Urban: ≥1500 addresses per km^2/Suburban: 1000-1499 addresses per km2/Rural: <1000 addresses per km^2

Table 2: General results from questionnaire

	N[c]	%
GPs' BMI		
<25	217	75.1
≥25	72	24.9
Frequent contact with a dietitian		
No	164	54.0
Yes	140	46.0
Specialized health care providers in building[a]		
No	50	16.3
Yes	257	83.7
Dietitian in building		
No	166	54.1
Yes	141	45.9
GPs' perception of health care provider suitability[b]		
GP		
Not at all/somewhat	201	67.2
Mainly/very suitable	98	32.8
Nurse practitioner		
Not at all/somewhat	87	29.1
Mainly/very suitable	212	70.9
Dietitian		
Not at all/somewhat	5	1.7
Mainly/very suitable	295	98.3
Weight-management consultant		
Not at all/somewhat	27	11.7
Mainly/very suitable	204	88.3
Psychologist		
Not at all/somewhat	189	65.4
Mainly/very suitable	100	34.6
Physical therapist		
Not at all/somewhat	184	63.2
Mainly/very suitable	107	36.8

[a] Health care providers who deliver nutritional and/or dietary advice
[b] Suitability of providing weight management for obese patients
[c] Due to missing values, N differs per question

GPs' vision and frequency of discussing weight

Figure 1 shows GPs' perception about overweight and obesity management. Most respondents (82.9%) agreed that promoting a healthy weight is an important part of GP care. Likewise, a majority (90.8%) agreed that GPs should educate patients with obesity about potential health risks. A smaller percentage (53.8%) agreed that GPs should discuss weight, even if the obese patient has another reason for the consultation. Figure 2 shows GPs' reported frequency of discussing weight for different stages of overweight and obesity. GPs were less likely to discuss weight with patients who had lower BMI and/or no weight-related health risks.

Figure 1: GPs' vision about weight management as part of GP care

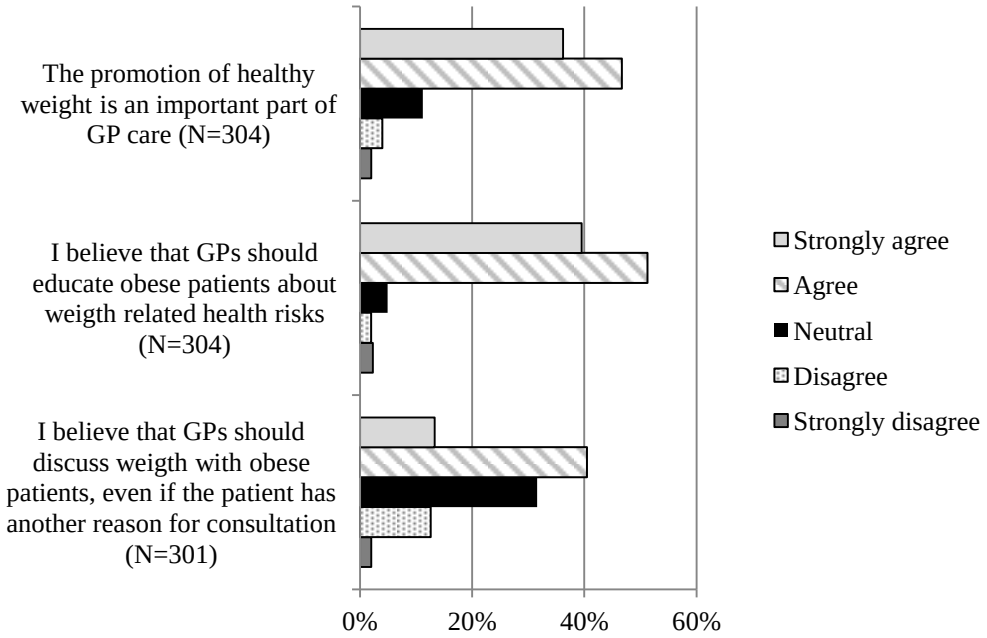
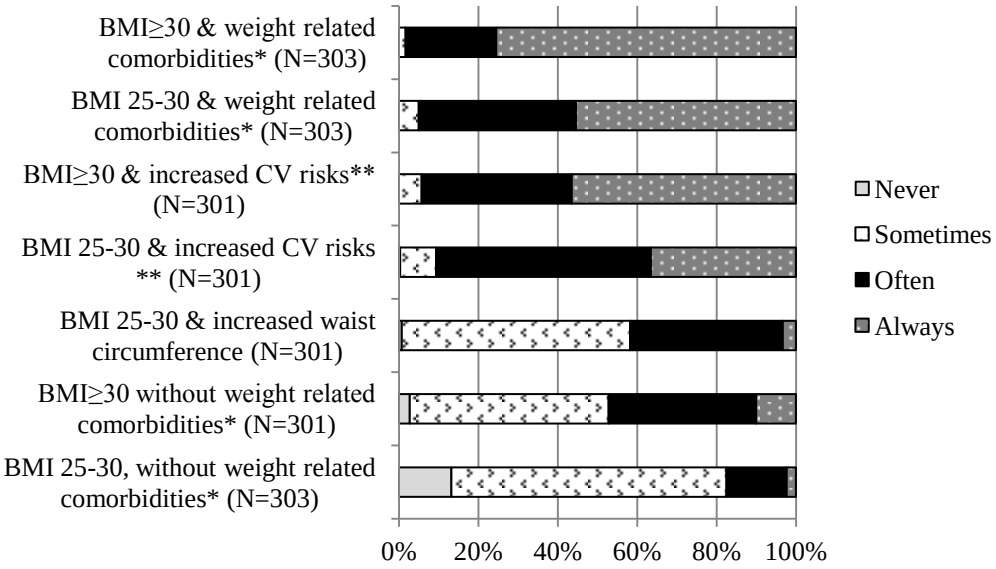


Figure 2: Frequency of discussing weight during consultations, for different populations



* For example osteoarthritis, DMII

** For example familial cardiovascular diseases, high blood pressure

Weight-related topics discussed by the GP

Weight-related topics that were most frequently broached by GPs during consultations were patients' motivation for weight loss (84.0%), amount of physical exercise (81.4%), weight-related health risks (77.5%), nutrition pattern (72.3%) and weight loss efforts in the past (67.1%). Additionally, 57.7% of the GPs reported to discuss possible interventions to achieve weight loss. Less often discussed by GPs were patients' current medication use (21.5%), psychosocial problems (32.3%) and environmental influences on weight (35.5%).

The two most frequently reported reasons for not talking about weight with an obese patient were "already talked about weight in the past" (76.9%) or "not having enough time" (59.9%). Patients lacking motivation (24.4%) and "afraid to negatively influence the relationship with the patient" (23.1%) were less frequently cited.

Factors associated with frequency of discussing weight

The mean score for GPs discussing weight sum score was 21.1 (SD 2.7; min-max: 14-28). In univariate analyses, GPs' age and their vision about promoting a healthy weight as an important part of GP care, were associated ($p<0.15$) with the discussing weight sum score. Table 3 shows the results from the multiple linear regression model. The discussing weight sum score increased by 0.06 points for every year that the GP's age was above the mean of 48 years. Further, GP's vision about promoting a healthy weight as an important part of GP care, was related to the frequency of discussing weight. The discussing weight sum score increased by 0.71 points for every point (on a 5-point scale) that GPs agreed more with the assertion that promoting a healthy weight is an important part of GP care.

Table 3: Multiple regression model of GP-related factors associated with discussing weight (scale 7-28) (N=303)

	Coefficient (95% C.I.)	***P*-value**
Age		
mean	0.06 (0.03; 0.10)	<0.01
Vision about GPs' duties of care		
Promoting healthy weight as an important part of GP care	0.71 (0.37; 1.05)	<0.01
Intercept	18.13 (16.70; 19.56)	

Collaboration with other health care providers for weight management

Most GPs (83.7%) reported the presence of one or more health care providers specialized in nutrition and/or dietary advice in the same medical center. Nearly half (46.0%) reported having frequent contact with a dietitian. The majority (98.3%) regarded the dietitian as a suitable health care provider for the dietary treatment of patients with obesity. Nearly a third (32.8%) of GPs regarded themselves as a suitable health care provider for obesity treatment (Table 2). Most frequently reported reasons for not referring to a dietitian were lack of patients' motivation for weight loss (63.8%), the fact that patients did not want to receive help from a dietitian (54.7%) and high costs of dietitian consultations (38.1%).

Referral percentage for obesity management and associated factors

GPs' average self-reported referral percentage of patients with obesity to other health care providers for nutrition and/or dietary advice was 47.7% (SD 27.8). Univariate analyses showed that GPs' BMI, frequent contact with a dietitian, the presence of a dietitian in the same medical building, vision of educating patients with obesity about weight-related comorbidities and discussing weight with patients were associated with the referral percentage for obesity management ($p<0.15$).

Table 4 shows the results from the multiple linear regression model. Overweight or obese GPs (BMI≥25) were significantly related to an 11.6% lower referral percentage for obesity management compared to those with a healthy weight. GPs'frequently in contact with a dietitian were significantly related to an increase of 11.8% in referral rate compared to GPs who were not frequently in contact with a dietitian. GPs who agreed with the assertion that educating patients with obesity about weight-related comorbidities is part of GP care reported a significantly higher referral percentage (24.1%) for obesity management.

Table 4: GP-related factors associated with referrals for obesity management (N=248)

	Coefficient (95% C.I.)	***P-value***
GPs' BMI		
<25	*Reference*	
≥25	-11.6 (-19.5; -3.7)	<0.01
Frequent contact with a dietitian		
No	*Reference*	
Yes	11.8 (4.2; 19.3)	<0.01
Dietitian in building		
No	*Reference*	
Yes	0.9 (-6.6; 8.5)	0.81
Vision about GPs' duties of care		
Educating patients with obesity about weight-related comorbidities		
Disagree	*Reference*	
Neutral	17.5 (-8.9; 44.0)	0.19
Agree	24.1 (4.2; 44.0)	0.02
Discussing weight		
Score 7-18	*Reference*	
Score 19-20	-4.7 (-16.1; 6.6)	0.41
Score 21-22	0.1 (-10.6; 10.8)	0.98
Score 23-28	10.5 (-0.5; 21.4)	0.06
Intercept	19.6 (-2.3; 41.5)	

Discussion

This explorative study showed that most GPs (82.9%) considered weight management for overweight and obese patients as part of their responsibility for providing care. However, weight is less frequently discussed by younger GPs. Next, weight is less frequently discussed with patients without weight-related comorbidities or with moderately overweight patients compared to obese patients. Nearly half of the GPs reported to refer obese patients to a weight management professional, preferably a dietitian. In addition, GPs who had frequent contact with a dietitian and those who felt more responsible for educating patients with obesity about weight-related comorbidities were more likely to refer obese patients. Finally, overweight and obese GPs were less likely to refer obese patients. The results of this study may be used to improve consistency in GPs' weight management policy, for example, by means of communication and education materials.

This paper identified three major findings. First, GPs' weight management policy appeared to be less targeted on primary prevention, neither on the social-environmental factors of overweight and obesity. The result that GPs are less involved in the weight management of people with moderate weight problems is in accordance with a study of Smith et al. [29]. Nonetheless, discussing weight to create awareness at an early stage of weight gain is important as this is the first step in behavioral change [30]. Besides, it is plausible to assert that reaching a healthy weight is easier at an early stage of weight gain. In addition, discussing the influence of medication use, psychosocial problems and environmental factors on patient's weight management should be encouraged, as these appeared to be talked about less frequently. The importance of these topics is frequently described in the literature. For example, overeating is a common coping mechanism in emotional distress [31]. The environmental availability of healthy or unhealthy food is related to individuals' food choices [32].

A second major finding of this study is that GPs' personal characteristics such as age, BMI and concerns appeared to be related to their reported weight management policy. Part of these findings may be explained by the reported negative attitudes towards obese patients among younger GPs [22].

Similar to the findings of Brotons et al.,[33] a relationship between GPs' BMI and frequency of discussing weight was absent. Possibly, overweight and obese GPs do not believe in an effective treatment of obesity in general. However, this should be studied further. From a patient's perspective, overweight or obese GPs negatively affect credibility, level of trust and intention to follow weight management advice [34]. Therefore, GPs need to be aware of how they can act as a positive health role model by having a healthy BMI themselves. Finally, GPs who believed that promotion of a healthy weight is an important part of GP care likewise discussed weight more often. This implies that, in order to increase GPs frequency of discussing weight, GPs' consciousness of weight management as part of their care should be stimulated, recommended by others as well [35]. With respect to this study that investigated the relationship between GPs' characteristics and their weight management policy, there is a lack of information about the relationship between patients' characteristics (e.g. age, sex, social economic status) and GPs' weight management.

A third important finding is that GPs weight management policy can be improved on several ways. Only half of GPs refer their obese patients to other health care providers for dietary treatment and weight is not always discussed, although guidelines recommend doing it. GPs reported several reasons for not talking about weight, with lack of time as the most important cause. This result was in keeping with the findings of other studies [17, 26] and comprehensible with the fact that Dutch GPs are paid per patient by the primary health care insurance cover, based on an average consultation time of 10 minutes [36]. However, by preventing weight-related diseases by means of optimal weight management, it is presumable that by referring to a weight management specialist, GPs could save time in the end.
Next, patients' lacking motivation was reported as a reason for GPs to not discuss patients' weight problem, neither refer the patient to a dietitian. But in fact, patients' lacking motivation is one of the main factors of failing weight management [37]. Therefore, patients' lacking motivation should be a signal to discuss patients' weight problem, use motivational interviewing and eventually refer to a specialized caregiver [37].

In contrast to other studies, [26] only one third of the respondents reported costs as an important reason for not referring to other health care providers. In the Netherlands, costs may be of little importance due to the system of reimbursement of dietary treatment from Dutch primary health insurance cover. To date, three hours of dietary treatment is included in the standard health insurance package of all Dutch citizens which is obligatory for all Dutch citizens. Remarkably, the presence of a dietitian in the same medical building was no indication for significantly higher referral rates. Problems in interdisciplinary communication are frequently mentioned in the literature [17, 24, 25]. The present findings indicate that GPs and dietitians should, even when they work in the same building, actively support frequent interdisciplinary communication, for example by providing face-to-face information about their processes [38].

This study has several limitations that may affect interpretation of the results. First, the number of non responders was substantial. In future studies, the response rate might be improved when using incentives, however, for the present study there was no budget available. Since web-based questionnaires appeared to result in higher response-rates, [39, 40] this is a recommendation for future studies as well. The second limitation is that the validity and reliability of the questionnaire, though developed carefully, is unclear. Final limitation is the potential information bias. Possibly respondents have provided socially acceptable answers to the questions which may have resulted in a overestimation of the number of GPs with a healthy BMI and the frequency of discussing weight issues with patients. Studies that surveyed patients' experiences, reported that GPs only intervened in half of the cases with obesity [11, 12]. The contrast between GPs' reporting and patients' experiences implicates for future studies that referral percentages need to be confirmed by using data from patient records. Other recommendations for further research are to assess the weight loss of patients referred to a dietitian in comparison to the weight loss of patients without a referral to a dietitian or to another health care provider in weight management.

The key strength of this study is the survey of GPs' perception of their overweight and obesity management policy. Besides examining GPs' self-reported frequency of discussing weight as well as their percentages for obesity management, we investigated factors associated with GPs' weight management policy. The representative population of GPs from all over the Netherlands strengthens the study's reliability.

In conclusion, this study showed that GPs' self-reported weight management policy is in accordance with the professional guideline. Nonetheless, in the context of prevention, discussing weight at an early stage of weight gain deserves more attention, especially for younger GPs. Education programs should emphasize the importance of discussing the influence of medication use, psychosocial problems and environmental factors on weight gain. To increase the referral percentage for obesity management, it is important for GPs and dietitians to strengthen interdisciplinary collaboration. Shared feelings of responsibility between GPs and specialists in dietary treatment could play a fundamental role in the struggle to beat overweight and obesity.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

JT, IS and CV were involved in the conception and design of the study. JT was involved with data collection. CK performed the statistical analysis and drafted the manuscript. All authors were involved in the interpretation of data and have critically reviewed the manuscript and have approved the final version submitted for publication.

Acknowledgements

We would like to thank Roisin de Jong for editing the manuscript. The study was funded by the Ministry of Health, Welfare and Sport.

References

1. World Health Organization. Controlling the global obesity edidemic 2003 [cited February 14, 2013]. Available from: http://www.who.int/nutrition/topics/obesity/en /.
2. Centraal Bureau voor de Statistiek. Lengte en gewicht van personen, ondergewicht en overgewicht; vanaf 1981 [Height and weight of persons, underweight and overweight; from 1981]. Den Haag: CBS; 2013 [cited February 13, 2013]. Available from: http://statline.cbs.nl/StatWeb/publication/?VW=T&DM=SLNL&PA=81565NED&LA=NL .
3. Bemelmans WJE, Hoogenveen RT, Visscher TLS, Verschuren WMM, Schuit AJ. Toekomstige ontwikkelingen in overgewicht [Future developments of overweight]. Bilthoven: RIVM.
4. Polder JJ, Takkern J, Meerding WJ, Kommer GJ, Stokx LJ. Kosten van ziekten in Nederland - De zorgeuro ontrafeld [Costs of illness in the Netherlands - The health care costs unraveled]. Bilthoven: RIVM, 2002.
5. World Health Organization. Obesity and overweight. Fact sheet N°311. Geneva: WHO, 2013.
6. Kolotkin RL, Meter K, Williams GR. Quality of life and obesity. Obes Rev. 2001;2:219-29.
7. Scott KM, Bruffaerts R, Simon GE, Alonso J, Angermeyer M, de Girolamo G, et al. Obesity and mental disorders in the general population: results from the world mental health surveys. Int J Obes (Lond). 2008;32(1):192-200.
8. Verheij RA, Van Dijk CE, Stirbu-Wagner I. Feiten en cijfers over huisartsenzorg in Nederland [Facts and numbers on care in Dutch general practices]. Utrecht: NIVEL; 2009 [cited March 12, 2013]. Available from: http://www.nivel.nl/linh-zorgregistratie-huisartsen .
9. van Dijk L, Otters HB, Schuit AJ. Moderately overweight and obese patients in general practice: a population based survey. BMC Fam Pract. 2006;7:43.
10. Van Binsbergen JJ, Langens FNM, Dapper ALM, Van Halteren MM, Glijsteen R, Cleyndert GA, et al. NHG-Standaard Obesitas. Huisarts Wet 2010;53(11):609-25.
11. Galuska DA, Will JC, Serdula MK, Ford ES. Are health care professionals advising obese patients to lose weight? Jama. 1999;282(16):1576-8.

12. Tham M, Young D. The role of the General Practitioner in weight management in primary care--a cross sectional study in General Practice. BMC Fam Pract. 2008;9:66.
13. Fogelman Y, Vinker S, Lachter J, Biderman A, Itzhak B, Kitai E. Managing obesity: a survey of attitudes and practices among Israeli primary care physicians. Int J Obes Relat Metab Disord. 2002;26(10):1393-7.
14. Forman-Hoffman V, Little A, Wahls T. Barriers to obesity management: a pilot study of primary care clinicians. BMC Fam Pract. 2006;7:35.
15. Hiddink GJ, Hautvast JG, van Woerkum CM, Fieren CJ, van 't Hof MA. Nutrition guidance by primary-care physicians: perceived barriers and low involvement. Eur J Clin Nutr. 1995;49(11):842-51.
16. Morris SE, Lean ME, Hankey CR, Hunter C. Who gets what treatment for obesity? A survey of GPs in Scotland. Eur J Clin Nutr. 1999;53 Suppl 2:S44-8.
17. Nicholas LG, Pond CD, Roberts DC. Dietitian-general practitioner interface: a pilot study on what influences the provision of effective nutrition management. Am J Clin Nutr. 2003;77(4 Suppl):1039s-42s.
18. Sonntag U, Brink A, Renneberg B, Braun V, Heintze C. GPs' attitudes, objectives and barriers in counselling for obesity--a qualitative study. Eur J Gen Pract. 2012;18(1):9-14.
19. Visser F, Hiddink G, Koelen M, van Binsbergen J, Tobi H, van Woerkum C. Longitudinal changes in GPs' task perceptions, self-efficacy, barriers and practices of nutrition education and treatment of overweight. Fam Pract. 2008;25 Suppl 1:i105-11.
20. Wynn K, Trudeau JD, Taunton K, Gowans M, Scott I. Nutrition in primary care: current practices, attitudes, and barriers. Can Fam Physician. 2010;56(3):e109-16.
21. Flocke SA, Gilchrist V. Physician and patient gender concordance and the delivery of comprehensive clinical preventive services. Med Care. 2005;43(5):486-92.
22. Ferrante JM, Piasecki AK, Ohman-Strickland PA, Crabtree BF. Family physicians' practices and attitudes regarding care of extremely obese patients. Obesity (Silver Spring). 2009;17(9):1710-6.
23. Pomeroy SE, Cant RP. General practitioners' decision to refer patients to dietitians: insight into the clinical reasoning process. Aust J Prim Health. 2010;16(2):147-53.

24. Mathus-Vliegen EMH. De "ideale diëtist" is flexibel en toegankelijk [The "ideal dietitian" is flexible and approachable]. Ned Tijdschr Diëtisten. 2006;61.
25. Pomeroy SEM, Worsley A. Enhancing the dietary management of general practice patients through collaborative care: perspectives of general practitioners and dietitians. . Nutrition and Dietetics. 2009;66:81-6.
26. Gunther S, Guo F, Sinfield P, Rogers S, Baker R. Barriers and enablers to managing obesity in general practice: a practical approach for use in implementation activities. Qual Prim Care. 2012;20(2):93-103.
27. Nederlands instituut voor onderzoek van de gezondheidzorg. Beroepenregistratie Databank Utrecht: NIVEL; 2013 [cited May 23, 2013]. Available from: http://www.nivel.nl/databank
28. Longnecker MT, Lyman Ott R. An introduction to statistical methods and data analysis. 6 ed: Dusbury Resource Center; 2008.
29. Smith AW, Borowski LA, Liu B, Galuska DA, Signore C, Klabunde C, et al. U.S. primary care physicians' diet-, physical activity-, and weight-related care of adult patients. Am J Prev Med. 2011;41(1):33-42.
30. de Vries H, Mudde A, Leijs I, Charlton A, Vartiainen E, Buijs G, et al. The European Smoking Prevention Framework Approach (EFSA): an example of integral prevention. Health Educ Res. 2003;18(5):611-26.
31. Iversen LB, Strandberg-Larsen K, Prescott E, Schnohr P, Rod NH. Psychosocial risk factors, weight changes and risk of obesity: the Copenhagen City Heart Study. Eur J Epidemiol. 2012;27(2):119-30.
32. Giskes K, van Lenthe F, Avendano-Pabon M, Brug J. A systematic review of environmental factors and obesogenic dietary intakes among adults: are we getting closer to understanding obesogenic environments? Obes Rev. 2011;12(5):e95-e106.
33. Brotons C, Ciurana R, Pineiro R, Kloppe P, Godycki-Cwirko M, Sammut MR. Dietary advice in clinical practice: the views of general practitioners in Europe. Am J Clin Nutr. 2003;77(4 Suppl):1048s-51s.
34. Puhl RM, Gold JA, Luedicke J, DePierre JA. The effect of physicians' body weight on patient attitudes: implications for physician selection, trust and adherence to medical advice. Int J Obes (Lond). 2013;37(11):1415-21.
35. van Dijk E, Kampen JK, Hiddink GJ, Renes RJ, van Binsbergen JJ, van Woerkum CM. A longitudinal study of changes in noticing and treating

patients' overweight by Dutch GPs between 1997 and 2007. Fam Pract. 2012;29 Suppl 1:i61-i7.

36. Deveugele M, Derese A, van den Brink-Muinen A, Bensing J, De Maeseneer J. Consultation length in general practice: cross sectional study in six European countries. Bmj. 2002;325(7362):472.
37. Dalle Grave R, Centis E, Marzocchi R, El Ghoch M, Marchesini G. Major factors for facilitating change in behavioral strategies to reduce obesity. Psychol Res Behav Manag. 2013;6:101-10.
38. Mitchell LJ, Macdonald-Wicks L, Capra S. Increasing dietetic referrals: Perceptions of general practitioners, practice nurses and dietitians. Nutrition and Dietetics. 2012;69:32-8.
39. Touvier M, Mejean C, Kesse-Guyot E, Pollet C, Malon A, Castetbon K, et al. Comparison between web-based and paper versions of a self-administered anthropometric questionnaire. Eur J Epidemiol. 2010;25(5):287-96.
40. Vergnaud AC, Touvier M, Mejean C, Kesse-Guyot E, Pollet C, Malon A, et al. Agreement between web-based and paper versions of a socio-demographic questionnaire in the NutriNet-Sante study. Int J Public Health. 2011;56(4):407-17.

Appendix 1 Questionnaire

1 The presented statements are about your perception of overweight and obesity management. Please indicate to what extent you agree with the next statements? (Scale 1-5, 1=fully disagree, 5=fully agree)
   a) Promoting healthy weight is an important part of GP care
   b) In my opinion, GPs should educate obese patients (BMI≥30) about potential health risks of their BMI
   c) In my opinion, GPs should discuss weight with obese patients, even when the patient visits the consultation for another complaint

2 How often do you talk about weight during consultations, in the following cases: (Scale 1-4, 1=never, 4=always)
   a) In case of overweight (BMI 25-30) and serious increased waist circumference
   b) In case of overweight (BMI 25-30) and increased cardiovascular risks
   c) In case of overweight (BMI 25-30) and weight related comorbidity (for example osteoarthritis, DMII)
   d) In case of overweight (BMI 25-30), without weight related comorbidity
   e) In case of obesity (BMI≥30) and increased cardiovascular risks (for example familial CVD, high blood pressure)
   f) In case of obesity (BMI≥30) and weight related comorbidity (for example osteoarthritis, DMII)
   g) In case of obesity (BMI≥30), without weight related comorbidity

3 In case of not talking about weight with an obese patient (BMI≥30) during consultations, what are the reasons for this? (multiple answers allowed)
   a) Does not apply, I always talk about weight
   b) I already talked about weight
   c) I do not have enough time
   d) I do not know what kind of advice I should give
   e) I am scared to affect the relation with the patient
   f) I am overweight as well, because of that I might be implausible at this point
   g) I believe, talking about weight is not GPs duty of care
   h) I believe, the patient should start the conversation about weight
   i) I believe, education does not work in case of obesity
   j) I believe, talking about weight is not meaningful if the patient has a healthy lifestyle
   k) I believe, talking about weight is not meaningful if the patient is demotivated

4 In case of talking about weight with an obese patient (BMI≥30) during consultations, which subjects are usually discussed? (multiple options possible)
   a) Does not apply, I never talk about weight
   b) Patients' motivation for weight loss
   c) The environmental influences (for example family or type of job) on weight
   d) Patients vision about a good and healthy weight
   e) Weight loss attempts in the past
   f) Patients' current level of physical activity
   g) Patients' current diet
   h) Patients' current medication use
   i) Psychosocial problems (for example a negative self-image)
   j) Realistic targets for weight loss
   k) Weight related health risks
   l) The possibilities for weight loss

5 To what extent do you think the next caregivers are suitable for dietary treatment of obese patients? GP, GPs nurse practitioner, dietitian, weight consultant, psychologist, physical therapist (Scale 1-4, 1=not at all, 4=very suitable)

6 Are you frequently in contact with a dietitian? (0=No, 1=Yes)

7 Are there caregivers offering nutrition and/or dietary advisement in your medical center? Me (GP), practical nurse, dietitian, weight consultant, nurse, psychologist, physical therapist. Multiple options are possible.

8 What percentage of obese people who visit your consultation, do you refer to a dietitian for nutrition- and/or dietary advice? Give an estimation between 0 of to 100%

9 In case an obese patient, what kind of scenario is fitting with patterns in your treatment? Most of the time…(0=No, 1=yes)
   a) I immediately refer to another caregiver
   b) My advice is to lose weight non-supervised. If this did not work, I start a treatment by myself
   c) My advice is to lose weight non-supervised. If this did not work, I start a treatment by myself. If this has failed, I refer to another caregiver
   d) My advice is to lose weight non-supervised. If this did not work, I refer to another caregiver
   e) I start a treatment by myself. If this did not work, I refer to another caregiver

10 In case of not referring obese patients to a dietitian, what are the most important reasons for this?
   a) Self-management is enough
   b) Other weight loss methods are more effective (like a diet-book or surgery)
   c) Dietitians' dietary treatment is not effective
   d) Other caregivers are more effective
   e) Dietary-costs are too high
   f) In my region, I do not know a dietitian to recommend
   g) In my region, I do not know a dietitian who delivers a combined lifestyle intervention.
   h) Patients do not want a dietetic-treatment
   i) Patients do not have enough motivation for dietary support
   j) My own treatment is better than other treatments

11 What is your height, measured in centimeters?

12 What is your current body weight, measured in kilogram? If you are pregnant, mention the pre-pregnancy weight

4

Changes in health insurance reimbursement system for dietitians: effects on utilization of dietetic services

Authors:
Tol. J., Swinkels, I.C.S., Spreeuwenberg, P.M., Veenhof, C., Seidell, J.C., de Bakker, D.H.

Abstract

Objective To examine the consequences of changing reimbursement for dietary advice on patients and dietetic practices. In the Netherlands, in 2011 and 2013 dietary advice was reimbursed for all medical indications by 4 and 3 hours, respectively. In 2012, 4 hours were reimbursed only for chronically ill patients.

Data sources Electronic health records of 65,847 patients in 68 private dietetic practices in primary healthcare from 2011 to 2013.

Study design This longitudinal observational study measured patients' demographics, health problems and consultations at the dietitian.

Data collection Anonymous data were retrospectively extracted from electronic health records.

Principal findings In 2012, significantly fewer patients visiting the dietetic practice lived in low socio-economic status areas or were treated for cardiovascular risk factors or other conditions than diabetes or copd compared to 2011. The average number of visiting patients significantly decreased by 32.1% in 2012 and 19.8% in 2013 when compared to 2011, and varied widely between practices. Practice characteristics explained 43% of the variation between practices.

Conclusions Limiting reimbursement of dietary advice for patients with chronic conditions results in inequitable access, fewer treatments for cardiovascular risks, malnutrition or gastrointestinal tract disorders and reduction in workforce of dietitians. Good collaboration with general practitioners positively influences coping with these changes in healthcare reimbursement.

Introduction

The prevalence of noncommunicable diseases, such as cardiovascular diseases, cancers, chronic respiratory diseases and diabetes is increasing around the world and these diseases are the biggest cause of death globally [1]. A key risk factor is an unhealthy lifestyle, which includes an unhealthy dietary pattern. Nutrition and diet are important aspects of the prevention and management of noncommunicable diseases [2]. Policy makers and health insurers have been looking for suitable reimbursement systems for medical nutrition therapy. These systems vary widely between countries. In the USA, reimbursement for dietetic services depends on disease and insurer [3, 4]. In Australia, particular target groups (e.g. patients with chronic conditions and complex care needs) can claim reimbursement for a limit of five consultations with an allied health care professional per year [5, 6]. Limitations for reimbursement are also prevalent in other countries such as in Canada [7]. In the Netherlands, all patients can claim reimbursement for a limited time of dietetic services per year. However in 2012, reimbursement for dietary advice was temporarily restricted. For research, these national changes in reimbursement for dietary services can be regarded as a natural experiment and provide an opportunity to examine the consequences for patients and dietetic practices. The results are of relevance to an international audience since they can be used in future debates on reimbursement for medical nutrition therapy by dietitians, patient organizations and policy makers.

Temporal restriction of reimbursement for dietary advice in the Netherlands

Since 2006, reimbursement for dietary advice in Dutch primary health care was included in the basic health insurance package. Until 2012, dietary advice covered up to four hours per calendar year for all medical conditions.

In 2012, the insurance cover for up to four hours of dietary advice per calendar year was restricted to patients with diabetes mellitus type 2 (DM), cardiovascular risks or patients with chronic o*bstructive pulmonary disease (COPD)* who were treated within a multidisciplinary coordinated care

program, such as a disease management program. However, only few dietitians had access to participate in disease management programs for cardiovascular risks, due to the nationwide enrollment of these programs being limited [8]. Consequently, reimbursement for dietary advice given to patients with cardiovascular risks was limited in the year 2012, as was the case for many other conditions (other than DM or COPD), such as malnutrition or food allergies.

In the next budget agreements of the Dutch government, extra finances were made available for prevention, including dietary advice. Therefore, in 2013, the reimbursement restriction for dietary advice were relaxed. Three hours of dietary advice per calendar year was covered by the basic health insurance package for all medical conditions [9]. In all years, people were able to buy additional health insurance cover for extra dietetic time.

Possible consequences of changes in reimbursement systems

Changes in reimbursement systems may have consequences for the uptake of health services [10]. The uptake of dietetic health services is generally low considering the high prevalence of noncommunicable diseases. For example, approximately 2% of the Dutch population used dietetic healthcare for various reasons in 2010 [11]. From the literature it is known that several determinants may influence a person's decision to use health services. Andersen's health behavioral model suggests that people's use of health services may differ through predisposing characteristics, such as age and gender, need and enabling resources, such as income [10]. In general, health services have to be accessible to everyone without the discrimination of vulnerable population groups, and they must be affordable for all including socially disadvantaged groups [12]. For example, based on the principle of equity, poor people should not be disproportionately burdened with health expenses as compared with richer people. The patient population of the dietitian can be considered a vulnerable population, since the largest group of patients visiting a dietitian in primary healthcare are treated for overweight and obesity, who generally belong to a lower socioeconomic group [13].

Aside from population characteristics, aspects related to the health practice may also influence health services use. For example, geographic location [14, 15], or the level of relationship between the general practitioners and the dietitians, in which the former may or may not encourage dietetic referrals [16]. Furthermore, having a contract for care delivery in a disease management program in 2012 may likewise explain the uptake of dietetic services, as this was one of the conditions for reimbursement of dietary advice in 2012.

Since the restrictions of reimbursement for dietary advice were temporary, it is to be expected that the number of patients visiting the dietitian would recover in 2013. This provides the opportunity to examine differences between recovery rates of practices and factors explaining these differences which contribute to the lack of knowledge on aspects that influence the uptake of dietetic services.

The aim of this study is to investigate the consequences of changing reimbursement for dietary advice on patients and dietetic practices in primary health care. The research questions of this study are:

- What are the differences in number of patients and characteristics of patients visiting dietetic practices between 2012 and 2013 compared to 2011?
- To what extent do practice characteristics influence the changes in the number of patients visiting dietetic practices between 2011, 2012, 2013?

Methods

Study design

This longitudinal study examines the effects of changes in reimbursement for dietetic practices in Dutch primary health care by using anonymous data from electronic health records (EHRs) and survey data. The patients received customary care without experimental interventions. According to the Dutch Medical Research Involving Human Subjects Act this study does not require ethics approval.

Recruitment

Dietetic practices were recruited in March 2012 through advertisements on the website of the Dutch Association of Dietitians and on the website of specific software frequently used by dietitians working in private practices (EvryDiëtist; Ensemble, Zoetermeer, the Netherlands). Dietitians could sign up by a digital contact form hosted by NIVEL (the Netherlands Institute for Health Services Research). Included were dietetic practices in primary care that recorded patient, treatment, and reimbursement information in EvryDiëtist (Ensemble) software. Two practices could not be included in the analysis since they were brought to an end or merged with another practice between 2012 and 2013 and therefore were not able to deliver data from 2012 and 2013. Excluded from the analysis were practices in which changes in patient visits were not related to the alterations in reimbursement for dietary advice, namely new practices that existed since the last quarter of 2010, and practices that reported to have alterations on job employment that were not related to changes in reimbursement. In return for participating, the dietitians received benchmark data.

Data collection

Data on patients were extracted from electronic health records and data on practices were collected by questionnaires.

Electronic health records: For the purpose of this study an option for data extraction to NIVEL was built into the menu bar of EvryDiëtist (Ensemble) software. By clicking on this button for data-extraction, anonymous health records of patients with a consultation after 1 January 2011 were

retrospectively extracted from EHRs and sent to NIVEL. Extracted data included characteristics of patients (i.e. year of birth, gender, postal region and a maximum of four nutrition related health problems) and health care utilization (i.e. reimbursement data on patients' total number of consultations and treatment time). Data on patients' 4-digits postcode region were used to link the patient with status-scores from the Netherlands Institute for Social Research. Status-scores are based on residents' income, educational level and work status in a postcode area; higher scores express higher status [17]. Consequently, status scores were categorized into low and high status scores; the cut-off value was set at the average status score of patients in the year 2011. Data on patient's nutrition related health problems were coded by means of a short version of CMT (Classification Medical Terms for dietitians) [18]. In the first quarter of 2012, 2013 and 2014, participants were approached by email and were asked to submit data to NIVEL.

Questionnaires: In the first quarter of 2012, dietitians were approached by email and were asked to fill-out an online survey. The online survey collected information about the practice, i.e. type of practice and number of dietitians employed, first year of the practice's existence and participation in a disease management environment. Furthermore, the survey included questions to check whether all information on reimbursement was registered in EvryDiëtist (Ensemble) software. Practices were not included in the cases where reimbursement information was partly registered in a different software program.

In the first quarter of 2014, dietitians were asked to answer three short questions. The first question measured whether the practice was merged with another practice, brought to an end, or went bankrupt between 2012 and 2013, and therefore could not send in EHR data. The second question measured the influence of changes in reimbursement system on job employment in the practice (e.g. each practice were asked to register the number of dietitians that worked in the practice and full time equivalents (FTE) for 2011-2013). The last question assessed whether the changes to job employment in the practice were due to the changes in the reimbursement system, or due to other aspects (such as limited working hours due to personal choices).

Analysis

For the first research question of this study, the characteristics of patients treated in 2012 and 2013 were compared to 2011 (reference year). Initially, the data from EHRs were aggregated by patient and year as they were collected at the level of a patients' consultation. Consequently, independent samples t-tests were performed to test for a statistical significant difference ($p<0.05$) in patients' mean age, status-score, and total number of consultations, between years. Chi-squared tests examined the difference in patients' gender, age category, referrer and frequently reported nutrition related conditions among the three years.

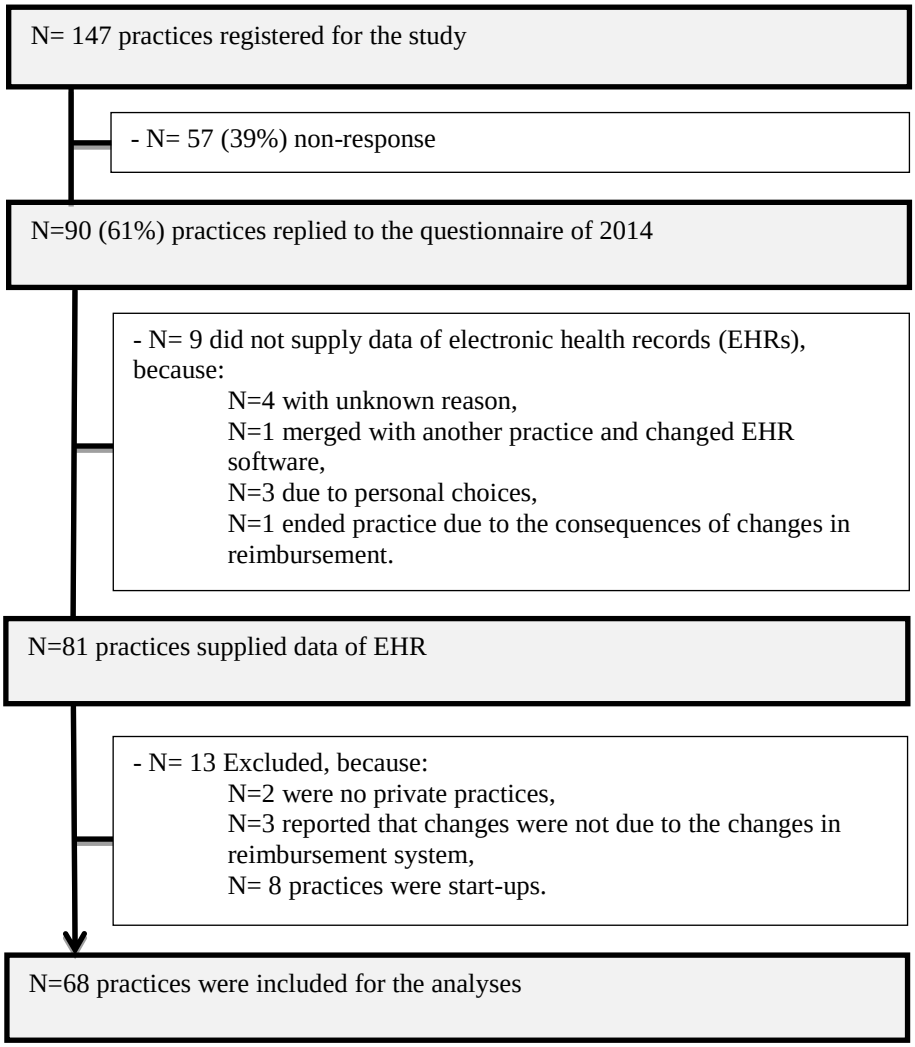
For the second research question of this study data were aggregated by year and practice. In this longitudinal dataset every practice has three waves of data (3 years). Repeated measures, multilevel linear regression model assessed the influence of practice characteristics on the number of patients visiting dietetic practices over time (basic model). The continuous outcome value to be studied was the total number of patients visited dietetic practice in 2011, 2012 and 2013. Since practice characteristics were measured at one point in time, interaction terms for practice characteristics and the number of patients visiting in 2012 and 2013 were included in the basic model. Practices with missing data on practice characteristics were eliminated from analysis. Data were analyzed in Stata 13.1.

Results

Sample

Of the 147 dietetic practices that signed up for this study, 61% responded to the questionnaire in 2014 (See figure 1). A total of 68 practices were included for the analysis. Between 1 January 2011 and 31 December 2013 they treated 65,847 patients.

Figure 1: Flow chart of study participants



Information of dietetic practices

At the start of this study, the most common type of private practice was the single-handed practice (72.1%, n=49), the others were group practices. Most of the group practices reported a reduction of job positions after 2011 (12 out of 19). The participating dietitians worked 0.83 ± 0.58 FTE (4 days a week) on average in 2011, which decreased in 2012 to 0.64 ± 0.60 FTE (P=0.06) and to 0.68 ± 0.43 FTE (P=0.08) in 2013.

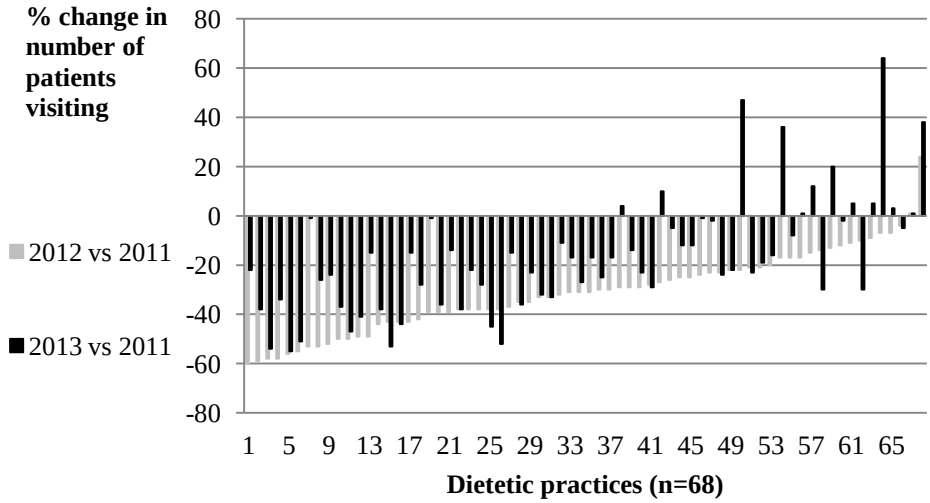
The practices were located throughout all 12 regions of the Netherlands. Most practices (n=36) were located in municipalities with 20,000 – 100,000 citizens, about a quarter were located in small municipalities (<20,000 citizens, n=17) or large municipalities (>100,000 citizens, n=15). In 2012, about three quarters of the practices treated patients within a disease management program (n=49), mostly for diabetes care delivery (n=46), followed by cardiovascular risk management (n=12) and COPD (n=8). 44% of the practice owners (n=27) were satisfied with collaboration with general practitioners.

Changes in number of patients visiting dietetic practices between 2011 and 2013

Almost all practices experienced a decrease in number of patients consulting the dietitian in 2012 (n=66, 97%) compared to 2011. The number of patients per practice significantly decreased by 125 patients on average (-32.1%; $P<0.001$) (See unadjusted model, Table 1).

In 2013, most practices did not fully recover (n=55, 81%) when compared to 2011; the number of patients per practice significantly decreased by 77 patients on average (-19.8%; $P<0.001$). Figure 2 shows that practices with a relative strong reduction in number of visiting patients in 2012 did not necessarily have a strong increase in visiting patients in 2013, compared to 2011. This relative change in visiting patients varied between practices.

Figure 2: Relative change in number of patients consulting the dietitian in 2012 and 2013 compared to 2011, by practice (n=68)



Changes in patient characteristics at dietetic practices between 2011 and 2013

Overall, the vast majority of patients treated in dietetic practice were females. Most patients were treated for cardiovascular risk factors (such as overweight (BMI ≥ 25) in adults, hypertension or hypercholesterolemia) followed by patients with diabetes or other nutrition related conditions (such as overweight in children, malnutrition, irritable bowel syndrome or food sensitivity) (See Table 1).

In 2012, the year of limiting reimbursement for dietary advice to patients with chronic conditions, the original patient population has changed significantly. For example, patients who consulted a dietitian were significantly older and significantly more patients lived in areas with a higher status score compared to 2011. Therefore, relatively more patients who lived in areas with a lower socioeconomic status score did not consult a dietitian. Furthermore, relatively more patients were referred by a general practitioner and consulted the dietitian for diabetes or COPD and fewer patients were treated for cardiovascular risk factors or other conditions compared to 2011.

In 2013, the year that restriction of reimbursement for dietary advice was discontinued, the patient population remained significantly different from 2011, except for changes in status score and type of health care referrer. In 2012 and 2013, patients received on average fewer consultations at the dietitian compared to 2011.

Table 1: Descriptive statistics of patient characteristics on number of patients visiting the dietitian over years

Patient characteristics	**2011 (reference)**	**2012**	**2013**
Gender (%)			
Men	34.0	35.5	35.0 *
Women	66.0	65.5	65.0 *
Age (years)			
Mean ± sd	48.4 ± 20.2	49.8 ± 20.1‡	49.6 ± 20.8‡
Socio economic status score (%)			
Low (score < 0.08)	44.1	41.9 ‡	43.5
High (score ≥ 0.08)	55.9	58.1 ‡	56.5
Referrer (%)			
General practitioner	94.6	95.4 ‡	94.7
Other referrer, e.g. internist			
Nutrition related conditions subdivided into disease management programs:			
COPD	1.8	2.5 ‡	2.6 ‡
Diabetes Mellitus	21.7	26.6 ‡	25.3 ‡
Cardiovascular risk management, e.g. overweight, obesity, hypertension or hypercholesterolemia	50.8	46.5 ‡	44.0 ‡
Other condition, e.g. overweight in children, malnutrition, irritable bowel syndrome.	25.7	24.4 †	28.1 ‡
Number of consultations per patient			
Mean ± sd	3.9 ± 2.8	3.6 ± 2.7 ‡	3.5 ± 2.8 ‡

* $P < 0.05$
† $P < 0.01$
‡ $P < 0.001$

Influence of practice characteristics on changes in number of patients visiting over time

Together, the practice characteristics included in the basic model explained 43.3% of the variance between practices compared to the unadjusted model. An overview of the unstandardized coefficient are presented in Table 2.

The unstandardized coefficients of the basic model can be used to calculate the absolute influence of the practice characteristics on the number of patients visiting over time. For example, the weighted average number of patients visiting the dietetic practice over time for practices that did not have a contract for participation in a disease management program, that were not satisfied with collaboration with the general practitioner, and located in small municipalities (the reference group) was 149.6 in 2011, 74.7 (149.6 – 74.9) in 2012 and 94.9 (149.6 – 54.7) in 2013. The number of patients visiting dietetic practices was significantly higher for practices that reported to be satisfied with collaboration with the general practitioner in 2012 and the other practice characteristics set at the reference value, i.e. 297.9 patients (149.6 + 148.3) visited these practices in 2011, 177.3 (149.6 – 74.9 + 148.3 – 45.7) in 2012 and 249.6 (149.6 – 54.7 + 148.3 + 6.4) in 2013.

Table 2: Association between practice characteristics on number of patients visiting the dietitian over the years - results of multilevel linear regression analyses [a]

	Unadjusted model (n=204, 68 practices)		**Basic model, adjusted for practice characteristics** (n=186, 62 practices)	
	B	*SE*	*B*	*SE*
Year (dependent variable)				
2011 (baseline)	390.2	37.3	149.6	84.2
2012	-125.1‡	14.1	-74.9*	32.9
2013	-77.4‡	15.5	-54.7	32.5
Contract with a disease management program in 2012				
No contract *(reference)*				
Contract			109.7	72.8
Interaction [contract *x* indicator for 2012]			-2.1	28.4
Interaction [contract *x* indicator for 2013]			-7.2	28.1
Collaboration with the general practitioner in 2012				
Not satisfied *(reference)*				
Satisfied			148.3*	64.6
Interaction [satisfied *x* indicator for 2012]			-45.7	25.2
Interaction [satisfied *x* indicator for 2013]			6.4	24.9
Practice location				
Small municipalities *(reference)*				
Medium size municipalities			106.5	73.1
Interaction [medium *x* indicator for 2012]			-29.2	28.5
Interaction [medium *x* indicator for 2013]			-18.1	28.2
Large municipalities			69.3	88.7
Interaction [large *x* indicator for 2012]			-21.0	34.6
Interaction [large *x* indicator for 2013]			3.1	34.2
Between dietetic practice variance (SE)	22804.1 (4157.7)		12938.9 (516253.8)	

[a] *Unstandardized coefficients*

* $P < 0.05$

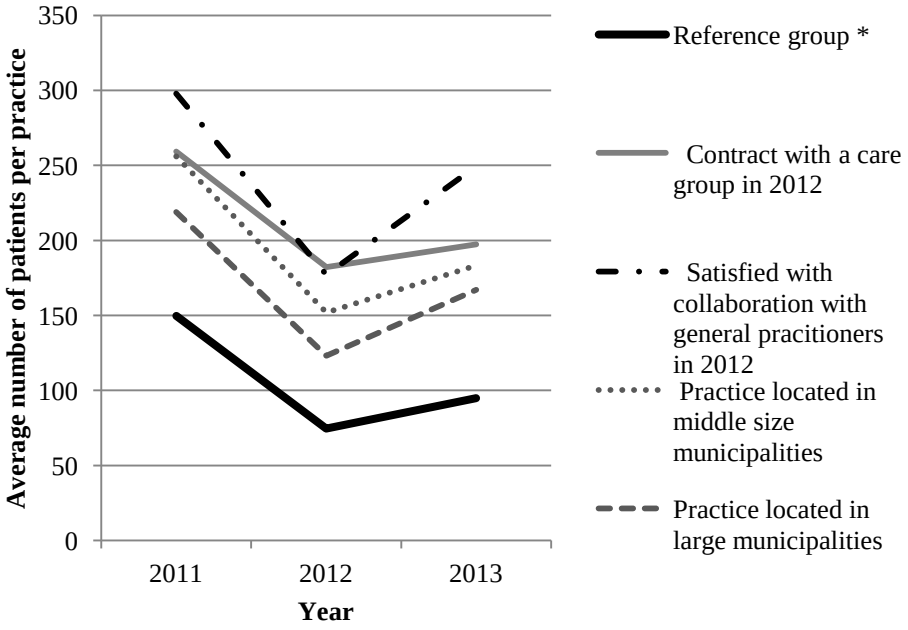
† $P < 0.01$

‡ $P < 0.001$

The absolute influence of the practice characteristics is presented in Figure 3. The decreasing lines express the absolute reduction in number of visiting patients in 2012 versus 2011 for different practice characteristics. Practices located in small municipalities, without a contract with a care group, who were not satisfied with collaboration with the general practitioner (the reference group) experienced the relatively strongest reduction of 50.1% in number of patients visiting the dietetic practice in 2012 versus 2011 (e.g. 74.7 versus 149.6 patients = -50.1%). At the same time, they experienced the lowest absolute reduction in number of patients visiting the dietetic practice in 2012 versus 2011, because these practices were smaller to begin with. Compared to the reference group, relatively lower reductions in number of visiting patients in 2012 versus 2011 were observed in practices with a contract with a care group (e.g. 182.3 versus 259.3 patients = -29.7%), practices that were satisfied with collaboration with the general practitioner (e.g. 177.2 versus 297.9 patients = -40.5%) and practices in middle (e.g. 152.0 versus 256.1 patients = -40.6%) or large municipalities (123.1 versus 218.9 patients = -43.8%).

The increasing lines from figure 3 express the absolute increase in number of visiting patients in 2013 versus 2012. The reference group experienced an increase of 27.0% in patients visiting the dietetic practice in 2013 versus 2012 (e.g. 94.9 patients versus 74.7 = 27.0%). Stronger recoveries (both absolute and relative) in number of patients visiting the dietitian in 2013 versus 2012 were observed in practices that reported to be satisfied with the collaboration with the general practitioner in 2012 (e.g. 249.5 versus 177.2 patients = 40.8%) and in practices located in large municipalities (e.g. 167.2 versus 123.1 patients = 35.9%).

Figure 3: Influence of practice characteristics on number of patients visiting the dietitian over years; weighted average based on results from linear multilevel regression analyses



* Reference groups: no contract with a care group in 2012 + not satisfied with collaboration with general practitioners in 2012 + practice located in small municipalities.

Discussion

The results of this longitudinal observational study showed that limiting reimbursement for dietary advice of patients with chronic conditions has major consequences for patients and dietetic practices in primary health care.

The first consequence was that specific patient groups did no longer consulted a dietitian, namely patients who lived in generally low socio-economic status areas and patients with cardiovascular risk factors or other conditions than diabetes or copd, such as overweight in children, malnutrition, irritable bowel syndrome or food sensitivity. These results indicate that many people were not able or not willing to pay for dietetic treatment. Therefore, restriction of reimbursement could result in inequitable access, fewer prevention efforts for cardiovascular disease and fewer patients treated for malnutrition or disorders of the gastrointestinal tract. Schoen et al. highlight the importance of health care reimbursement to enable more equitable access to primary and preventative care. They showed that when insured, middle- and lower-income adults across American states were far more likely to have primary care access or receive preventive care [19]. It is unclear whether patients who withdraw from dietetic treatment have experienced further deterioration of health or that they made dietary changes by using other (self-help) methods. However, given the high prevalence of nutrition related diseases, such as overweight and obesity [20], it is important that patients who are medically in need of dietary treatment are not hindered to use these kind of services.

The second consequence was that patients who accepted dietetic treatment used fewer consultations at the dietitian. Both financial considerations of the patient and agreements of the dietitian and the care group (who takes responsibility for services delivery within a diseases management program) could be related to this finding. For example, the dietitian could only purchase the dietetic care that was contracted within the care group by the system of bundled payments, e.g. three hours per patient a year, for patients receiving care from a disease management program in 2012. However, less

intensive treatments may have consequences for the effectiveness of treatment [21, 22].

During the time of limited reimbursement, the workforce of dietitians decreased substantial. In 2012, almost all practices experienced a decrease in visiting patients (-32% on average). Therefore, reimbursement for dietary advice has a major influence on the uptake of dietetic services. The decrease in visiting patients at the dietitian resulted in a parallel reduction of FTE by practices and for many dietitians in a group practice this resulted in employment termination. A national survey among Dutch dietitians reported that at the end of 2012 about 1 out of 10 dietitians had lost their jobs [23]. Other severe consequences for practices, such as merging with another practice or bankruptcy, were minimally reported in our study. These results were checked by manually searching a national database on bankruptcy (http://www.faillissementen.com/) using company names and healthcare activities related to nutrition or diet. Nicolasen et al. reported that a national organization of dietetic practices went bankrupt in 2012, resulting in about 125 employment terminations [24]. Some of the dietitians directly opened a new private practice and made a second beginning. The Dutch Association of Dietitians confirms the relatively low number of bankrupt practices but severe reductions in workforce, as shown from the results in this study.

Extending reimbursement for dietary advice in 2013 did not result in complete recovery for most of the practices. Possibly, the relatively slow and incomplete recovery process of dietetic health services use after changes in reimbursement was related to the national increase of the own risk element in the basic healthcare package; it increased from €170 in 2011 to €220 in 2012 and €350 in 2013 [25]. When making health care costs, this is the amount persons have to pay by themselves in a year. Therefore, people who haven't used health care costs over €350 in 2013 and visit a dietitian may still end up paying for dietetic treatment themselves, which could have influenced their decision to see a dietitian.

Further results showed that most of the practice characteristics examined in this study were not significantly associated with the number of patients visiting over time. However, the practice characteristics had a relatively strong influence on the absolute number of patients visiting over time and together explained 43% of the differences in decrease and recovery of visiting patients, which was relatively high compared to other studies in allied health care examining practice variation in patients' visits [26, 27]. Practices with a good collaboration with the general practitioner had experienced significantly fewer effects of the changes in reimbursement on decrease in number of patients visiting the practice. A survey among Dutch general practitioners showed that general practitioners referred more often for dietary advice in case they had regular contact with a dietitian [28]. The association was not found for dietitians who were working in the same building, which stresses the effect of multidisciplinary collaboration for dietitians. In general, the results showed that practices located in small municipalities, without a contract with a care group and who were not satisfied with collaboration with the general practitioner have experienced the lowest absolute decrease in visiting patients. However, because they were generally small to begin with, they had the relatively strongest decrease. The recovery of these practices went slow, both from absolute and relative point of views.

The main limitation of this study is the risk for selection bias due to the convenience sample of practices. This may have resulted in inclusion of more active practices, and since there were no national data available on characteristics of dietetic practices it was impossible to check for representativeness of the study sample. Furthermore, the results in this study may be somewhat underestimated since only one participating practice reported to have stopped working due to the consequences of the changes in reimbursement, while it may be possible that the group of non-responders also consisted of practices that have stopped working. However, we do not believe the results to be very underestimated because of the relatively low number of bankrupt practices on national level. Despite these limitations, strength of this study is the large sample size of dietetic practices that participated in the study and that data were collected retrospectively based on dietitians' routine registration in electronic health records. Therefore,

there were little missing values and no risk for recall bias. Another strength of this study was that additional information of the practices was collected using questionnaires, making it was possible to check for complete registration of declarations in the EHR and to explain differences between practices.

Conclusion

Limiting reimbursement for dietary advice to patients with specific chronic conditions treated in multidisciplinary coordinated care programs can result in inequitable access, fewer prevention efforts for cardiovascular disease, fewer treatments for malnutrition or disorders of the gastrointestinal tract and reduction in workforce of dietitians. Good collaboration with general practitioners seems to have a positive influence on dealing with these changes in health care reimbursement.

References

1. World Health Organization. Noncommunicable diseases country profiles 2011. Geneva: WHO, 2011.
2. World Health Organization. Diet, Nutrition and the prevention of chronic diseases. Geneva: WHO, 2003.
3. Academy of nutrition and dietetics. The Academy of Nutrition and Dietetics Advocates for Expanded Nutritional Coverage under Medicare. 2013. Available from: http://www.eatright.org/Media/content.aspx?id=6442467246 .
4. White JV, Ayoob KT, Benedict MA, Chynoweth MD, Gregoire M, Howard RL, et al. Registered dietitians' coding practices and patterns of code use. J Am Diet Assoc. 2008;108(7):1242-8.
5. Australia Government. Group allied health services under medicare. People with type 2 diabetes – items 81100 to 81125. : Commonwealth of Australia 2011. Available from: http://www.health.gov.au/internet/main/publishing.nsf/Content/514E97511D22026CCA2576680080FA52/$File/Information%20for%20allied%20health%20professionals.pdf .
6. Australia Government. Chronic disease individual allied health services under medicare. For patients with a chronic (or terminal) medical condition and complex care needs – items 10950 to 10970. : Commonwealth of Australia 2012. Available from: http://www.health.gov.au/internet/main/publishing.nsf/
7. Dietitians of Canada. Dietitians in private practice. 2014. Available from: http://www.dietitians.ca/Dietitians-Views/Health-Care-System/Private-Practice.aspx .
8. Tol J, Swinkels IC, Struijs JN, Veenhof C, de Bakker DH. Integrating care by implementation of bundled payments: results from a national survey on the experience of Dutch dietitians. Int J Integr Care. 2013;13:e055.
9. The Ministry of Health Welfare and Sport. Besluit van 13 oktober 2012, houdende wijziging van onder meer het Besluit zorgverzekering en het Besluit zorgaanspraken AWBZ in verband met maatregelen 2013 in het zorgpakket. Staatsblad van het Koninkrijk der Nederlanden [Bulletin of Acts, Orders and Decrees of the Kingdom of the Netherlands]. 2012;512.
10. Andersen RM. Revisiting the behavioral model and access to medical care: does it matter? JHealth SocBehav. 1995;36(1):1-10.

11. de Graaf-Ruizendaal WA, Kenens RJ, de Bakker DH. Vraag Aanbod Analyse Monitor – Verantwoording rekenmodellen versie 3.1 [Demand Supply Analysis Monitor - Explaining mathematical models version 3.1]. Utrecht: NIVEL; 2012.
12. Economic and Social Counsil. The right to the highest attainable standard of health Geneva: United Nations; 2000 [cited 2014 17-03]. Available from: http://www.unhchr.ch/tbs/doc.nsf/%28symbol%29/E.C.12.2000.4.En .
13. Savelkoul M, Uiters E. Overgewicht: Sociaaleconomische verschillen naar geslacht en leeftijd. In: Volksgezondheid Toekomst Verkenning, Nationaal Kompas Volksgezondheid. Bilthoven: RIVM; 2014. Available from: http://www.nationaalkompas.nl/gezondheidsdeterminanten/persoonsgebonden/overgewicht/overgewicht-sociaaleconomische-verschillen-naar-geslacht-en-leeftijd/ .
14. de Jong J. Explaining medical practice variation: social organization and institutional mechanisms. Utrecht: NIVEL, 2009.
15. Unger CC, Warren N, Canway R, Manderson L, Grigg K. Type 2 diabetes, cardiovascular disease and the utilisation of primary care in urban and regional settings. Rural Remote Health. 2011;11(4):1795.
16. Mitchell LJ, Macdonald-Wicks L, Capra S. Increasing dietetic referrals: Perceptions of general practitioners, practice nurses and dietitians. Nutrition and Dietetics. 2012;69:32-8.
17. The Netherlands Institute for Social Research. Statusscores [10-11-2014]. Available from: http://www.scp.nl/Onderzoek/Lopend_onderzoek/A_Z_alle_lopende_onderzoeken/Statusscores .
18. Vektis. Verwijsdiagnose dieetadvisering Zeist: Vektis; 2013 [cited 2014 27 January]. Available from: http://ei.vektis.nl/WespCodelijstenDetail.aspx?Co_Ge_Code=COD610&Co_Or_Code=NVD .
19. Schoen C, Hayes SL, Radely DC, Collins SR. Access to primary and preventive health care across states prior to the coverage expansions of the Affordable Care Act. Issue Brief (Commonw Fund). 2014;17:1-14.
20. World Health Organization. Obesity, situation and trends. Geneva: WHO, 2013.

21. Dansinger ML, Tatsioni A, Wong JB, Chung M, Balk EM. Meta-analysis: the effect of dietary counseling for weight loss. Ann Intern Med. 2007;147(1):41-50.
22. Finkler E, Heymsfield SB, St-Onge MP. Rate of Weight Loss Can Be Predicted by Patient Characteristics and Intervention Strategies. JAmDietAssoc. 2011.
23. Stottelaar M. Resultaten Grote Nieuws voor diëtisten enquête 2012 Ijsselstein: Scriptum communicatie over voeding; 2012. Available from: http://www.nieuwsvoordietisten.nl/fileadmin/inhoud/enquetes/Resultaten_Nieuws_voor_dietisten_enque%CC%82te_2012_.pdf .
24. Nicolasen L, Schipper ML. Wijziging basispakket leidt tot halvering aantal dieetconsulten. Volkskrant. 2012 14 february.
25. Home Finance. Eigen risico zorgverzekering [30-10-2014]. Available from: http://www.homefinance.nl/zorgverzekering/informatie/eigen-risico-basisverzekering.asp .
26. Swinkels IC, Wimmers RH, Groenewegen PP, van den Bosch WJ, Dekker J, van den Ende CH. What factors explain the number of physical therapy treatment sessions in patients referred with low back pain; a multilevel analysis. BMC Health Serv Res. 2005;24(5):74.
27. Tol J, Swinkels IC, Spreeuwenberg PM, Leemrijse CJ, de Bakker DH, Veenhof C. Factors associated with the number of consultations per dietetic treatment: an observational study. BMC Health Serv Res. 2012;12:317.
28. Kloek CJJ, Tol J, Veenhof C, van der Wulp I, Swinkels ICS. Dutch General Practitioners' weight management policy for overweight and obese patients. BMC Obesity. 2014;1(2).

5

Overweight and obese adults have low intentions of seeking weight-related care: a cross-sectional survey

Published as:
Tol J, Swinkels IC, De Bakker DH, Veenhof C, Seidell JC. Overweight and obese adults have low intentions of seeking weight-related care: a cross-sectional survey. BMC Public Health. 2014;14:582.

Abstract

Background The prevalence of obesity is growing worldwide. Obesity guidelines recommend increasing the level of weight-related care for persons with elevated levels of weight-related health risk (WRHR). However, there seems to be a discrepancy between need for and use of weight-related care. The primary aim of this study is to examine predisposing factors that may influence readiness to lose weight and intention to use weight-related care in an overweight population.

Methods A population-based, cross-sectional survey was conducted. Data were collected using an online self-administered questionnaire sent to a population-representative sample of 1,500 Dutch adults on the Health Care Consumer Panel (n=861 responded). Data were used from individuals (n=445) with a mildly, moderately or severely elevated level of WRHR. WRHR status was based on self-reported data on Body Mass Index, risk assessment for diabetes mellitus type 2 (DM2) and cardiovascular disease (CVD), or co-morbidities.

Results 55.1% of persons with increased WRHR were ready to lose weight (n=245). Depending on level of WRHR; educational level, marital status, individuals with an accurate perception of their weight and better perceptions and expectations of dietitians were significantly related to readiness to lose weight. Most of them preferred individual weight-loss methods (82.0% of n=245). 11% (n=26 of n=245) intended to use weight-related care. Weight-related care seeking was higher for those with moderate or severe WRHR. Expectations and trust in dietitians did not seem to influence care seeking.

Conclusions Many Dutch adults who are medically in need of weight-related care are ready to lose weight. Most intend to lose weight individually, and only a few intend to use weight-related care. Therefore, obesity prevention initiatives should focus on monitoring weight change and weight-loss plans, and timely referral to obesity management. However,

many people are not ready to lose weight. For this group, strategies for behaviour change may depend on WRHR, perceptions of weight and dietitians, educational level and marital status. Obesity prevention initiatives should focus on increasing the awareness of the seriousness of their condition and offering individually appropriate weight management programmes.

Background

Obesity prevention and the effective management of those with obesity constitute a public health challenge. Worldwide, the prevalence of obesity has increased in recent decades [1]. In the Netherlands, the prevalence of obesity among adults has risen from 5% in 1981 to 12% in 2011 and the prevalence of overweight from 28% to 36% [2]. The increase is considered to be the result of a combination of environmental, biological and social factors [3]. Because of the complexity of this multi-factorial problem, many people need help with the prevention of weight gain and with weight-management. The rationale for adult weight management in Dutch primary healthcare is based on the health risks associated with overweight and obesity. In general, Dutch obesity guidelines recommend increasing the level of weight-related care for persons with elevated levels of weight-related health risk (WRHR) (see Figure 1) [4]. Dietary treatment is an important aspect of weight management, which can be given by a multidisciplinary team of healthcare professionals, including dietitians. Dietetic treatment has been demonstrated to be a moderately effective weight loss strategy for overweight persons in primary health care [5].

In general, weight-related care use may depend on several aspects including medical need, enabling factors (such as insurance and accessibility) and predisposing factors (such as demographics and health beliefs) [6, 7]. The medical need for weight-related care is high due to the prevalence of overweight and obesity. In the Netherlands, weight-related care use will likely also be influenced, albeit to a lesser extent, by enabling factors, since dietary treatment is partly reimbursed by health insurers (see Figure 1). Moreover, direct access (self-referral) to dietitians is available. In spite of this, the actual use of dietetic care services is relatively low: approximately 2% of the Dutch population used dietetic healthcare for various reasons in 2010 [8]. This raises questions about the type of individuals who are ready to lose weight and use weight-related care, as well as the influencing factors.

In analysing individuals' readiness to lose weight, the trans theoretical model of change suggests how change occurs. According to this model, behaviour change occurs over time and involves different stages: precontemplation, contemplation, preparation, action, maintenance and termination. Persons in the first two stages of change are ambivalent about making change. They may benefit from counselling about the harm caused by their current behaviour and the benefits of change. Those at the preparation stage, or further, generally have a plan of action. The middle stages of preparation and action are the most volatile, and people are likely to progress or regress, depending on the help they receive [9]. These individuals and those in further stages are likely to make progress and therefore appear to be ready for weight-related care. A number of factors can impact readiness for weight change, including demographics (i.e. gender, race, education) [10, 11] or psychological factors (attitudes, beliefs, and intentions) [11-14].

Social-psychological factors that may influence the uptake of weight-related care include beliefs about weight, perceptions and expectations of care providers who give dietary advice, and trust in care providers [7]. Better knowledge about predisposing factors such as perceptions and expectations of, and trust in care providers may contribute to our understanding of the relatively low use of dietary health services. Few studies have been carried out on public perceptions and expectations of care providers who give dietary advice. A study by Crocker showed doctors were the preferred choice for nutritional information, followed by dietitians; however, younger people preferred advice from health food shops [15]. Gorton et al. showed that dietitians perceived themselves to be one of the last resorts for weight loss. However, clients ranked them as the second choice after exercise [16]. The authors report that clients hold a variety of expectations regarding private practice dietitians and that initial perceptions were not particularly favourable.

In sum, little research is available about the types of persons with elevated levels of WRHR who are ready to lose weight, those who are intending to use weight-related care, and those who are not. More knowledge about the influencing factors might contribute to our understanding of health

behaviour in an overweight population and improve policies aimed at activating people to reduce WRHR. Therefore, the primary aim of this study was to examine predisposing factors that may influence readiness to lose weight and important reasons for not being ready to lose weight in an overweight population. The secondary aim of the study was to examine predisposing factors that may influence intention to use weight-related care in an overweight population ready to lose weight.

Figure 1: Contents of obesity prevention and management by level of weight-related health risk

Definition of weight-related health risk
In the Netherlands, obesity prevention and management is based on weight-related health risk (WRHR). For adults, the WRHR is based on Body Mass Index (BMI), risk assessment for diabetes mellitus type 2 (DM2) and cardiovascular disease (CVD), and the presence of co-morbidities. In the current study, data were used from participants with a mildly, moderately, severely or very severely elevated level of WRHR.

BMI kg/m²	No increased risk for DM2 and CVD	Increased risk for DM2 and CVD [a]	Co-morbidities [b]
≥ 25 BMI < 30	Mildly increased	Moderately increased	Moderately increased
≥ 30 BMI < 35	Moderately increased	Moderately increased	Severely increased
≥ 35 BMI < 40	Severely increased	Severely increased	Very severely increased
BMI ≥ 40	Very severely increased	Very severely increased	Very severely increased

[a] In this study, increased risk for DM2 and CVD was defined as having (self-reported) high blood sugar, high blood pressure, or being physical inactive (i.e. 0 days a week at least 30 minutes of physical activity).

[b] In this study, comorbidities included having a (self-reported) (severe) heart disease, a myocardial infarction, diseases of the joints, or DM2. Where self-reported conditions or diseases were unknown (n=24) it was assumed that the respondents did not have the specified condition or disease.

Recommended treatment
Obesity prevention is indicated for adults with a mildly elevated level of WRHR. This may include individual advice on a healthy lifestyle. Persons with a moderately, severely, or very severely increased WRHR are advised to follow a combined lifestyle intervention, including physical activity, behaviour change and dietary advice.

Reimbursement of dietary advice
At the time of this study (September 2012), dietary advice was reimbursed by the Dutch primary health care insurance, which covered up to four hours for patients with obesity (BMI ≥ 30), or overweight (BMI 25-29.9) with comorbidities. Therefore, reimbursement was not covered for persons with a mildly elevated level of WRHR or for some persons with a moderately elevated level of WRHR. However, patients can buy extra cover, for additional treatment time.

Methods

Sample

Data were collected in September 2012 through an online survey, sent out to a sample of 1,500 members of the Dutch Health Care Consumer Panel [17, 18]. The sample was drawn from 6000 panel members aged 18 years and older. Stratified random sampling was used in order to obtain a sample of panel members that was representative by age and gender of the Dutch population aged 18 years and older. The panel members have agreed to answer questions about healthcare on a regular basis. General information was available concerning the participants (e.g. age, gender, ethnicity, level of education, net monthly household income in euros, marital status, and self-reported general health status) as these characteristics were documented upon entry to the panel and are updated regularly. Data were processed anonymously. The Dutch Health Care Consumer Panel is registered with the Dutch Data Protection Authority (no. 1262949). The study does not fall within the scope of the Medical Research Involving Human Subjects Act and therefore does not require ethical approval [19].

Questionnaire

For the purpose of this population-based, cross-sectional study, we developed a questionnaire which was filled out by the sample of panel members. Data were used from a subgroup of respondents with a medical need for obesity prevention or management, including persons with mildly, moderately, severely, or very severely increased WRHR (see Figure 1).

The questionnaire (see Appendix 1) contained questions on age, gender, health conditions, symptoms or diseases, body weight, height, level of physical activity, perception of body weight, readiness to lose weight, intention to use weight-related care, past weight-related care use, perceptions of dietary advice from care providers, expectations of dietitians and a rating for trust in dietitians. Dichotomous variables were created for level of physical activity (< 5 days a week / ≥ 5 days a week), accurate perception of body weight (no/yes), perceiving dietitians as suitable care providers (no/yes) and readiness to lose weight (ready to change/not ready to change).

The following question was used regarding level of physical activity: "How many days a week do you exercise for at least 30 minutes per day?". Having an accurate perception of body weight was defined using the question: "To what extent do you agree with the following statement; I believe I am too heavy". Respondents with a BMI ≥25 who answered "strongly agree" or "somewhat agree" were defined as having an accurate perception. Those who answered "somewhat disagree" or "strongly disagree" were categorised as having an inaccurate perception. Perceiving dietitians as suitable care providers was defined using the question "Please indicate the extent to which you consider the following care providers to be qualified to give dietary advice?". Respondents who answered "very unqualified" or "somewhat unqualified" were defined as not perceiving dietitians as suitable care providers. Those who answered "somewhat qualified" or "very qualified" were categorised as perceiving dietitians as suitable care providers. Readiness to lose weight was defined using the question, "Do you plan to start losing weight?". Respondents with a BMI ≥25 who answered "Yes, I'm planning to start during the next month" or "Yes, I am currently changing" were defined as ready to change. Those who responded "No" or "Yes, I'm planning to change but not in the short term" were classified as not ready to engage in weight-related behaviour change. Additionally, they were asked about the most important reasons (maximum three out of fifteen) for not planning on losing weight, or at least not in the short term. Respondents who were ready to change were asked about their weight loss plans (multiple choice), including the intention to use weight-related care from a care provider.

Face validity was assessed by the authors of this study and two researchers of the Dutch Health Care Consumer Panel. In addition, the questionnaire was commented on by the programme committee of the Dutch Health Care Consumer Panel (i.e. by the Ministry of Health, Welfare and Sport and the Federation of Patients and Consumer Organizations in the Netherlands) and the Dutch Association of Dietetics. Moreover, the questionnaire was piloted on 10 adults who were not included in this study sample.

Data-analysis

Univariate and bivariate analyses were performed to examine predisposing factors that may influence readiness to lose weight, and, subsequently, intention to use weight-related care. Results on readiness to lose weight were stratified by WRHR. The small sample size of respondents intended to use weight-related care limited further statistical analysis. Categorical data were tested using Chi-square tests and Fisher exact tests for groupings with < 5 responders in a field, to test for a significant difference in the dichotomous outcome variables of readiness to lose weight and intention to use weight-related care. Furthermore, a scale was developed to test the overall influence of the nine items on the expectations regarding dietitians of respondents ready to lose weight and intending to receive weight-related care. Confirmatory factor analysis was used to evaluate the factor structure. The Kaiser-Meyer-Olkin measure of sampling adequacy was high (0.85) and one factor had an eigenvalue of greater than one (3.78). The data demonstrated strong internal reliability with Cronbach alpha of 0.87. Consequently, average scale scores were calculated for each respondent. Higher scores (range 1-4) indicated better expectations of dietitians. Differences in the expectations scores between readiness to lose weight, and, subsequently intention to use weight-related care were examined using Wilcoxon rank sum tests. In addition, the difference in the trust-rating of dietitians between readiness to lose weight and intention to receive weight-related care was tested using Student's t-test.

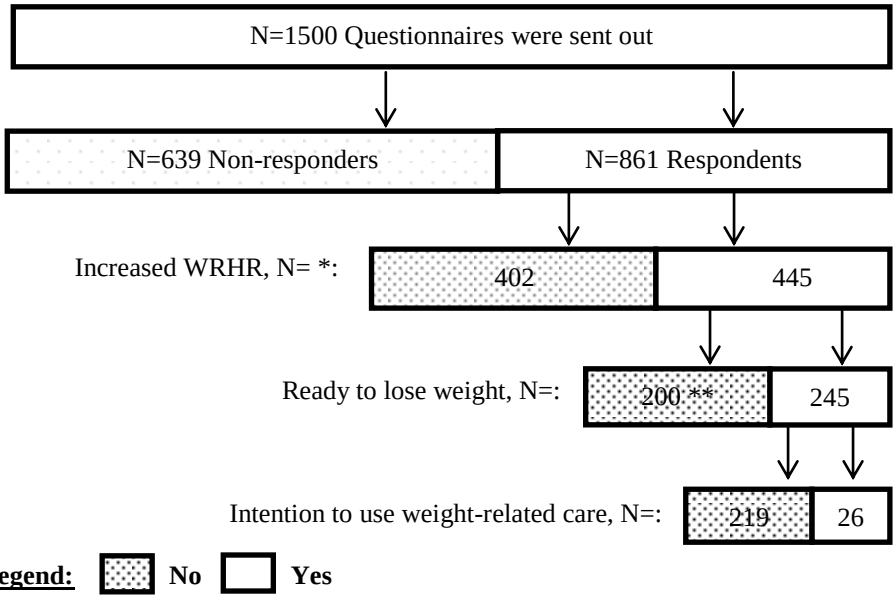
A multivariate logistic regression model, stratified by WRHR, was created to examine the impact of each independent variable on readiness to lose weight. Covariates with $p<0.15$ in bivariate analysis were selected for inclusion in the logistic model since more traditional levels may fail to identify variables known to be important [20]. Covariates were then removed from the model if they were non-significant ($p<0.05$). The model was tested for multi-collinearity. Odds ratios and 95% CIs were calculated. Data were analysed in STATA (Version 12, 2011, STATACorp, College Station Texas).

Results

Response

The response rate for this study was 57% (n=861) (see Figure 2). Respondents were significantly older compared with non-responders (mean age 54.5 ± 14.6 versus 49.4 ± 16.3, p<0.001). There were no significant differences between respondents' gender (p=0.427) and educational level (p=0.376) compared with the non-responders. The results in this study are presented for 445 persons (51.7%) with an increased weight-related health risk.

Figure 2: Flowchart of study participants



* Weight-related health risk (WRHR) could not be determined for 14 respondents since they did not enter details of their height and weight. Body mass index (BMI) could therefore not be calculated. Since BMI was missing at random, these 14 respondents were excluded from the analysis.

** 200 respondents with an elevated level of weight-related health risk (BMI ≥ 25) were not ready to lose weight. They were asked to report the three most important reasons for not being ready to lose weight.

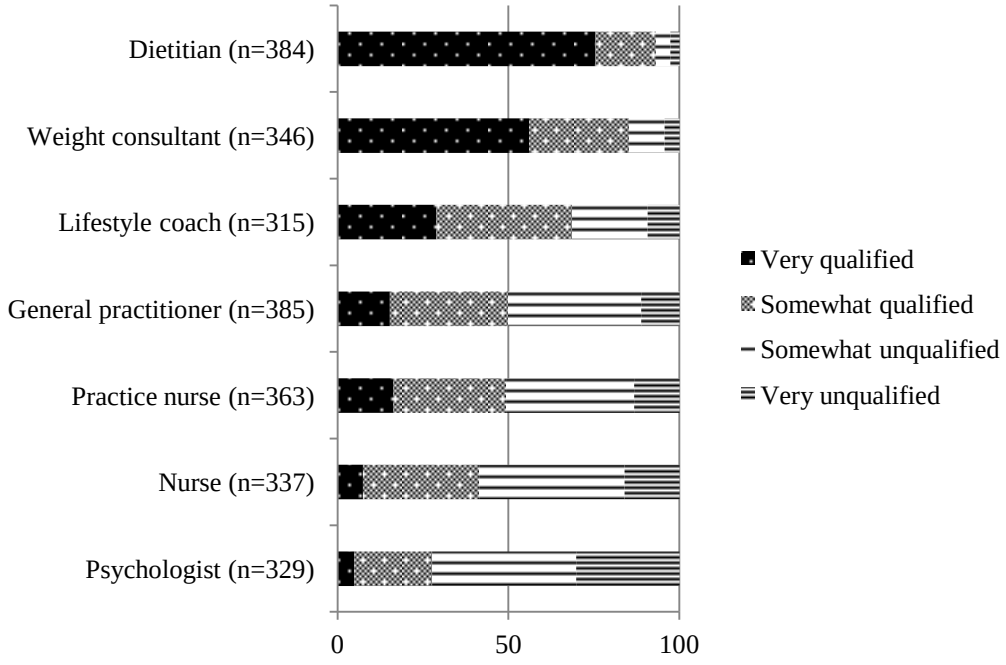
Demographics and beliefs about weight and health

The participants in this study with an increased WRHR were on average 56.4 years old and the vast majority were native Dutch (96%). A large proportion had an advanced level of education (60.1%) and the majority were married (71.3%). The largest group had a mild (39.3%) or moderately (45.8%) increased WRHR. A majority did not exercise for 30 minutes at a moderate-level on at least five days a week (59.1%). Furthermore, about one out of two persons had an accurate perception of their weight (50.5%) or perceived their general health as good (55.7%).

Perceptions and expectations regarding care providers giving dietary advice

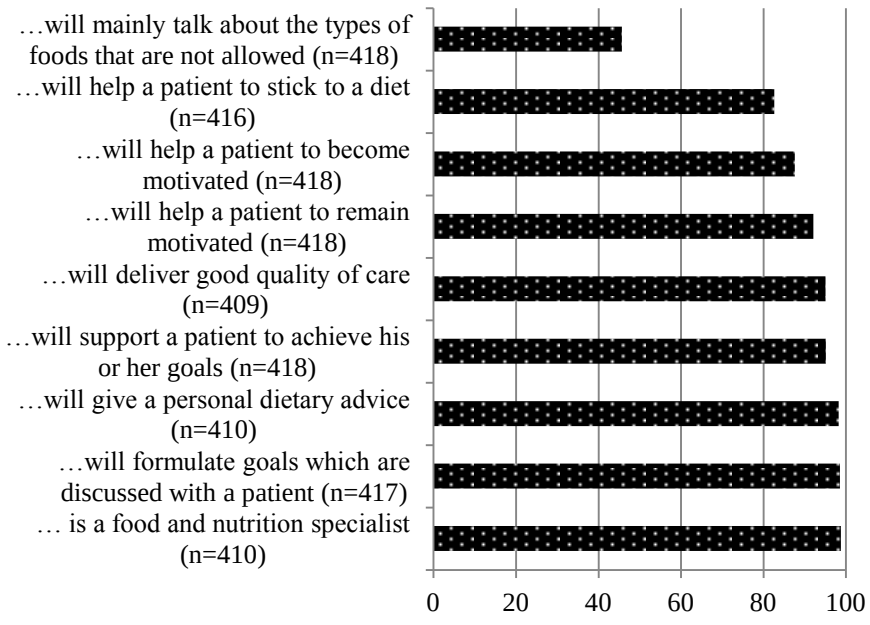
The majority of persons with an increased WRHR believed that dietitians were most qualified to give dietary advice, followed by weight consultants and lifestyle coaches. General practitioners and practice nurses shared fourth place (see Figure 3).

Figure 3: Perception of care providers' suitability to give dietary advice, among persons with an increased weight-related health risk (%)



Many respondents did not have an opinion about the role of care providers in giving dietary advice, which was apparent from the relatively high number of blanks per item. The expectations that respondents had of dietitians are described in Figure 4. The average 4-point scale expectations-score (mean ± sd) was 3.5 ± 0.5, meaning that respondents generally had positive expectations of dietitians. Respondents who were not aware of what a dietitian does (n=17) and those with up to four missing items on expectations (n=7) were not included in the average scale score on expectations. Three additional statements were presented in order to compare the results regarding expectations of dietitians to expectations of other care providers or diet methods. The majority of respondents believed or fully believed that dietitians are better than other care providers or diet methods, since they: deliver better quality of care (83.1%), give individual dietary advice (96.4%), or help patients to remain motivated (90.9%). Persons with an increased WRHR reported a trust-rating in dietitians of 7.3 ± 1.2 on a scale from 1-10, where 82.9% reported a 7 or higher.

Figure 4: Expectations of dietitians, among persons with an increased weight-related health risk who (fully) agreed with the statements (%)



What type of persons were ready to lose weight?

Overall, 55.1% (n=245) of persons with an increased WRHR were ready to lose weight (see Figure 21). Table 1 shows the unadjusted relationship between predisposing factors and being ready to lose weight, stratified by WRHR.

Table 1: Influence of determinants on reported readiness to lose weight, stratified by weight related health risk [a]

Characteristic	Mild WRHR N=175		Moderate WRHR N=204		Severe WRHR N=66	
	Ready N=102	Not ready N=73	Ready N=101	Not ready N=103	Ready N=42	Not ready N=24
Age category, n (%)	P=0.121		**P=0.044**		P=0.559	
20 – 39.9	28(73.7)	10(26.3)	21(67.7)	10(32.3)	5(55.6)	4(44.4)
40 – 49.9	17(51.5)	16(48.5)	13(59.1)	9(40.9)	5(55.6)	4(44.4)
50 – 59.9	26(60.5)	17(39.5)	23(52.3)	21(47.7)	9(81.8)	2(18.2)
60+	31(50.8)	30(49.2)	44(41.1)	63(58.9)	23(62.2)	14(37.8)
Gender, n (%)	**P=0.002**		**P=0.003**		P=0.670	
Male	47(48.0)	51(52.0)	42(39.6)	64(60.4)	18(66.7)	9(33.3)
Female	55(71.4)	22(28.6	59(60.2)	39(39.8)	24(61.5)	15(38.5)
Ethnic background, n (%)	P=0.197		P=0.649		P=0.548	
Western	8(80.0)	2(20.0)	3(50.0)	3(50.0)	1(33.3)	2(66.7)
Non-Western	94(57.0)	71(43.0)	98(49.5)	100(50.5)	41(65.1)	22(34.9)
Educational level, n (%)	P=0.996		**P=0.002**		P=0.754	
Low (primary, lower vocational)	7(58.3)	5(41.7)	6(20.0)	24(80.0)	6(60.0)	4(40.0)
Advanced (secondary, pre-university)	58(58.6)	41(41.4)	61(50.8)	59(49.2)	26(66.7)	13(33.3)
High (bachelor's degree or more)	33(57.9)	24(42.1)	29(60.4)	19(39.6)	8(57.1)	6(42.9)
Marital status, n (%)	P=0.491		P=0.234		**P=0.039**	
Married	75(55.6)	60(44.4)	68(47.6)	75(52.5)	24(63.2)	14(36.8)
Divorced	7(63.6)	4(36.4)	9(45.0)	11(55.0)	8(88.9)	1(11.1)
Widowed	3(60.0)	2(40.0)	8(44.4)	10(55.6)	6(85.7)	1(14.3)
Never married	16(72.7)	6(27.3)	16(69.6)	7(30.4)	4(33.3)	8(66.7)
Net monthly household income, n (%)	P=0.484		**P=0.005**		P=0.978	
Up to €1450	11(61.1)	7(38.9)	11(39.3)	17(60.7)	10(62.5)	6(37.5)
€1450 < €2100	21(50.0)	21(50.0)	28(44.4)	35(55.6)	7(58.3)	5(41.7)
€2100 <€2900	28(54.9)	23(45.1)	24(40.7)	35(59.3)	13(61.9)	8(38.1)
€2900 +	40(64.5)	22(35.5)	38(70.4)	16(29.6)	10(66.7)	5(33.3)
Physical activity, n (%)	**P=0.046**		P=0.864		P=0.587	
< 5 days / week	63(65.0)	34(35.0)	61(50.0)	61(50.0)	29(65.9)	15(34.1)
≥ 5 days / week	39(50.0)	39(50.0)	40(48.8)	42(51.2)	13(59.1)	9(40.9)
Accurate perception of weight, n (%)	**P<0.001**		**P<0.001**		P=0.615	
No	40(38.5)	64(61.5)	36(33.6)	71(66.4)	5(62.5)	3(37.5)
Yes	61(88.4)	8(11.6)	65(67.7)	31(32.3)	37(63.8)	21(36.2)
Self-perceived general health, n (%)	P=0.474		P=0.536		P=0.532	
Poor / Fair	5(50.0)	5(50.0)	18(50.0)	18(50.0)	15(71.4)	6(28.6)
Good	51(63.0)	30(37.0)	65(51.2)	62(48.8)	22(62.9)	13(37.1)
Very good / excellent	43(54.4)	36(45.6)	16(41.0)	23(59.0)	4(50.0)	4(50.0)
Perceive dietitian as suitable caregiver, n (%)	P=0.082		P=0.291		P=0.461	
No	8(88.9)	1(11.1)	6(75.0)	2(25.0)	4(44.4)	5(55.6)
Yes	82(56.9)	62(43.1)	88(53.0)	78(47.0)	30(62.5)	18(37.5)
Expectations of dietitian score	P=0.186		**P=0.007**		P=0.189	
mean ± sd	3.5±0.5	3.6±0.5	3.6±0.4	3.4±0.5	3.6±0.4	3.4±0.5
Trust-rating in dietitians	P=0.489		P=0.197		P=0.941	
mean ± sd	7.5±0.9	7.3±1.3	7.4±1.0	7.2±1.1	6.9±1.9	7.0±1.3

[a] Unadjusted results from bivariate analysis.

Results of multivariate regression analyses varied between levels of WRHR (see Table 2). Respondents with a mildly increased WRHR had significantly higher odds for readiness to lose weight in case they perceived the dietitian as suitable caregiver, or in case they had an accurate perception of weight. Subsequently, respondents with a moderately increased WRHR had significantly higher odds for readiness to lose weight in individuals with an accurate perception of weight, in those with an advanced or high educational level and in those with higher expectation scores of dietitians. Furthermore, individuals with a severely or very severely increased WRHR and not married had a higher odds for readiness to lose weight compared to married individuals.

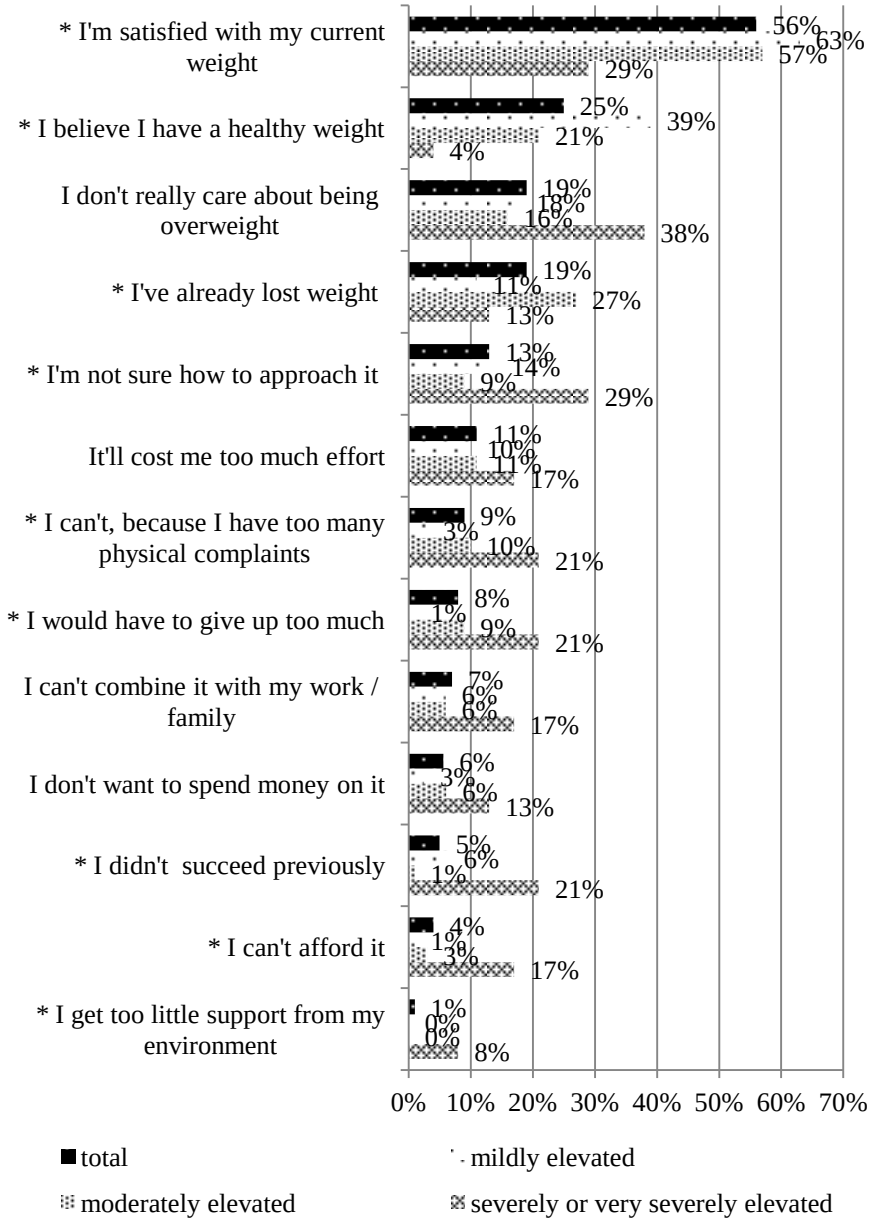
Table 2: Factors associated with reported readiness to lose weight, stratified by weight related health risk - results from multivariate logistic regression analysis

	Odds Ratio	*P-value*	(95% CI)
Final model: Ready to lose weight, mild WRHR			
Accurate perception of weight			
No (reference)			
Yes	14.16	<0.001	(5.71 ; 35.07)
Perceive dietitian as suitable caregiver			
No (reference)			
Yes	0.09	0.025	(0.01 ; 0.74)
Final model: Ready to lose weight, moderate WRHR			
Educational level			
Low (reference)			
Advanced	4.83	0.006	(1.58 ; 14.78)
High	7.49	0.001	(2.19 ; 25.63)
Accurate perception of weight			
No (reference)			
Yes	3.68	<0.001	(1.91 ; 7.10)
Expectations of dietitian score	2.70	0.011	(1.26 ; 5.80)
Final model: Ready to lose weight, severe WRHR			
Marital status			
Married (reference)			
Divorced	4.67	0.167	(0.53 ; 41.3)
Widowed	3.50	0.268	(0.38 ; 32.1)
Never married	0.29	0.078	(0.07 ; 1.14)

What are the most important reasons for not being ready to lose weight?

About half of the respondents with increased WRHR were not ready to lose weight (n=200). The main reasons given varied according to level of WRHR (see Figure 5). Those with a mildly increased WRHR were more often satisfied with their current weight or believed they were at a healthy weight compared to those with a higher level of WRHR. Persons with a severely or very severely increased WRHR were more often not ready to lose weight compared to persons with a lower level of WRHR because they: were not sure how to approach weight loss, had too many physical complaints, would have to give up too much, did not succeed previously, received less support from family, or could not afford it.

Figure 5: Reasons for not being ready to lose weight by weight-related health risk (% of n=200)



* There was a statistically significant difference ($p<0.05$) between the three levels of WRHR.

What type of persons intended to use weight-related care?

The largest group of respondents with an increased weight-related health risk who were ready to lose weight preferred individual weight loss methods without help from others, for example by starting to eat healthier and exercise more often (82.0% of n=245). Eleven per cent (n=26 of 245) intended to use weight-related care from a care provider, especially from dietitians (n=12). Having the intention to use weight-related care was significantly higher for those with a moderately, severely, or very severely elevated level of WRHR compared to those with a mild WRHR. In addition, those who perceived their general health as poor more often intend to use weight-related care (see Table 3). Most of the those with the intention to use weight-related care reported to have received dietary advice from a care provider in the past (n=23 of 26). Overall, 33.9% of the persons who were ready to lose weight (12.8% mild WRHR, 46.0% moderate WRHR, 57.5% severe WRHR) reported to have received dietary advice from a care provider in the past (results not in table).

Table 3: Influence of determinants on reported intention to use weight-related care [a]

Characteristic	Intention to use weight-related care from a care provider		
	Yes N=26		No N=219
Age category, n (%)		P=0.090	
20 – 39.9	4(7.4)		50(92.6)
40 – 49.9	5(14.3)		30(85.7)
50 – 59.9	2(3.5)		56(96.6)
60+	15(15.3)		83(84.7)
Gender, n (%)		P=0.491	
Male	13(12.2)		94(87.9)
Female	13(9.4)		125(90.6)
Ethnic background, n (%)		P=0.622	
Western	26(11.2)		207(88.8)
Non-Western	0(0.0)		12(100)
Educational level, n (%)		P=0.208	
Low (primary, lower vocational)	4(21.1)		15(78.9)
Advanced (secondary, pre university)	15(10.3)		130(89.7)
High (bachelor's degree or more)	5(7.1)		65(92.9)
Marital status, n (%)		P=0.226	
Married	14(8.4)		153(91.6)
Divorced	3(12.5)		21(87.5)
Widowed	4(23.5)		13(76.5)
Never married	5(13.9)		31(86.1)
Net monthly household income, n (%)		P=0.920	
Up to €1450	3(9.4)		29(90.6)
€1450 < €2100	7(12.5)		49(87.5)
€2100 <€2900	7(10.8)		58(89.2)
€2900 +	8(9.1)		80(90.9)
Physical activity, n (%)		P=0.596	
< 5 days / week	15(9.8)		138(90.2)
≥ 5 days / week	11(12.0)		81(88.0)
Accurate perception of weight, n (%)		P=0.560	
No	7(8.6)		74(91.4)
Yes	18(11.0)		145(89.0)
Self-perceived general health, n (%)		P=**0.016**	
Poor / Fair	8(21.1)		30(78.9)
Good	15(10.9)		123(89.1)
Very good / excellent	2(3.2)		61(96.8)
Weight-related Health Risk:		P<**0.001**	
Mild	2(2.0)		100(98.0)
Moderate	11(10.9)		90(89.1)
Severe or very severe	13(31.0)		29(69.1)
Perceive dietitian as suitable caregiver, n (%)		P=0.440	
No	1(5.6)		17(94.4)
Yes	23(11.5)		177(88.5)
Expectations of dietitian score		P=0.404	
mean ± sd	3.5 ± 0.4		3.5 ± 0.4
Trust-rating in dietitians		P=0.804	
mean ± sd	7.3± 1.7		7.4± 1.1

[a] Unadjusted results from bivariate analysis. The data involves persons who are eligible for obesity management (with an increased weight related health risk).

Discussion

The current study provides insight into readiness to lose weight, intention to use weight-related care, and influencing factors, in an overweight population with weight-related health risks. This information is important for the development of strategies for successful obesity prevention and management.

Results show that 52% of the study sample had an elevated level of weight-related health risk, and were therefore in medical need of obesity prevention or management. Perceived need for obesity prevention and management was considerably lower since about half of them were ready to lose weight, i.e. they were in the preparation, active, or maintenance stage for weight loss. These results are comparable with results from a survey conducted among primary care patients [13]. Only eleven per cent of those who were planning to lose weight preferred to do so with help from a care provider and one in three reported to have received dietary advice from a care provider in the past. The extent to which the dietary advice helped them is unknown; however, most were not planning to lose weight with help from a health provider again. Future research in evaluating patient experiences with dietary treatment is therefore recommended. From the results of this study, it is not clear why there is an overall low intention to use weight-related care. Weight-related care seeking might possibly be higher if more effective strategies for the prevention of overweight and obesity were available at population level. The lack of reimbursement for dietary treatment in some individuals with a mildly or moderately elevated level of WRHR would most likely not have influenced their intention to use weight-related care from a care provider. Most people believed that dietary treatment was reimbursed and this did not vary between WRHR groups, nor was it significantly associated with the intention to use weight-related care (results not shown).

The discrepancy between perceived need for and intended use of weight-related care can be explained by the relatively large group of people who were ready to lose weight but preferred to do so individually. However, individual weight loss attempts often prove to be less effective than weight

management programmes [21]. Obesity prevention initiatives should therefore include the advice that weight loss without skilled supervision usually does not lead to successful weight loss and may do more harm than good. In addition, monitoring of weight change and weight loss plans should be encouraged [22]. If overweight patients fail to lose weight on their own, care providers could refer them for obesity management. Care providers may in turn offer evidence-based effective lifestyle advice with realistic levels of effort and outcomes (5-10% weight loss is associated with meaningful improvements in health related risk factors [23, 24]). In addition, they may emphasise the importance of weight relapse prevention and use techniques such as motivational interviewing and elements of self-determination theory (such as autonomy, competence, and relatedness) that have been shown to predict long-term success in weight management [25].

Even though there was a large group that was willing to lose weight, there remained a sizable group of overweight and obese people who need encouragement to start losing weight. This group consisted mainly of individuals who were about 60 years of age, male, with a low level of education, a net monthly household income between €1450 < €2100, an inaccurate perception of their own weight, and a moderately elevated level of WHRH. Most of those who were not ready to lose weight were precontemplators, since they seemed uninformed about the consequences of their weight (e.g. were satisfied with their current weight, believed they had a healthy weight or did not seem to care about being overweight), or had previously tried to change but became demoralised about their ability to do so [9]. Therefore, obesity prevention initiatives should attempt to focus on increasing awareness of the seriousness of their condition and on offering individually appropriate weight management programmes. General practitioners can play an important role in stimulating behaviour change regarding weight loss. Some studies have shown that general practitioners discuss weight with less than half of obese patients who visit their practice [22, 26]. More discussions about weight management or referral options might help patients become more willing to engage in weight-behaviour change and receive weight-related care.

Although dietitians are not the only professionals qualified to give dietary advice, the majority of respondents believed that dietitians were the most qualified care providers in the area of dietary advice and they had generally positive expectations of dietitians. The level of trust (83%) in dietitians was high compared with Dutch public trust ratings in complementary and alternative medicine (45%) and was comparable to public trust ratings in general practitioners (89%) and physical therapists (87%) [27]. Furthermore, respondents believed that psychologists were the least suitable to give dietary advice. The role of psychologists in weight management, as described in clinical guidelines, is mainly focussed on providing psychological support for behaviour change [4]. The psychological component of weight management might be quit unknown amongst the population.

Further results show several predisposing factors associated with readiness to lose weight. Depending on one's WRHR, higher odds for readiness to lose weight were observed for those who perceive the dietitian was a suitable caregiver and those with higher expectations of dietitians. Therefore, promoting dietitians' activities may potentially stimulate the motivation to change weight, which can be seen as a prerequisite for obesity management. In addition, persons with a moderately increased WRHR and higher educational level were associated with being at advanced stages of readiness for weight loss. A survey of the U.S. population also reported that sociodemographics were associated with trying to lose weight [10]. One of the underlying explanations for differences in socio economic status on readiness to change may be related to beliefs and lack of knowledge about health risks, e.g. people with a low socioeconomic status might not see the health risks of being overweight [28]. Furthermore, sociologists argue about the importance of marital status in affecting adults' body weight. Results from our study showed that divorce, widowhood and never being married was significantly associated with being ready to lose weight in individuals with severe WRHR, compared to those who are married. This result was in line with a systematic literature review reporting that transitions into marriage were associated with weight gain, whereas transitions out of marriage (through divorce and widowhood) were associated with triggering

weight loss [29]. Further results showed that accurately perceiving oneself as being overweight or obese is considered to be an important aspect of weight change, which was in agreement with others [30]. Overall, the results on readiness to lose weight need to be confirmed by others, as the observed associations are inconsistent among different levels of WRHR.

Regarding intention to use weight-related care, the results show that persons who perceived their general health as poor more often have this intention. Additionally, adults with a risk factor for cardiovascular diseases, co-morbidities and/or obesity were more inclined to seek weight-related care than overweight adults without risk factors for CVD. Accordingly, these findings indicate that the type of individuals seeking weight-related care from a care provider match the guidelines for obesity management. Multivariate regression analysis stratified by weight related health risk was not applied, considering the small sample size of persons intending to use weight-related care from a care provider. Consequently, these results need to be confirmed within a larger sample.

A strength of this study was the representative sample of Dutch adults, who regularly receive online health care surveys. Since the panel members were familiar with online surveys, we do not expect this would have biased the response. An important limitation of our study is the lack of generalisability of the results. Our study population consisted mainly of relatively older people, and thus the results may be less representative of younger age groups. Moreover, the response rate was relatively low compared with the response rate of more than 70% usually obtained from this panel [18]. The topic of the questionnaire may not have been of interest to all. This could potentially have influenced the prevalence of people with an elevated level of WRHR. However, the prevalence of overweight and obesity is comparable to national estimates of self-reported data [2], as well as national estimates of prevalence by gender and age group [31]. Additionally, potential sources of response bias may exist, as the questions on lifestyle and health were self-reported. Evidence suggests that women often under-report their weight and men often over-report height [32]. This may have resulted in under-classification of WRHR groups. However, since the prevalence of

overweight and obesity is comparable to national estimates of self-reported data, we do not expect weight to be very much under-reported. Furthermore, the results in this study are likely to be overestimated because people tend to be optimistic about their behaviour and intentions. Nevertheless, self-report is the only means of capturing patients' stage of behaviour change.

Conclusion

The medical need for obesity prevention and management is high; however, about half of the Dutch adults who are in need of weight-related care are ready to lose weight. Most have the intention to lose weight individually, and only a few have the intention to use weight-related care.

Dietitians were perceived to be the most qualified health professionals to give dietary advice. Weight-related care seeking was not influenced by perceptions, expectations or trust in dietitians. In general, weight-related care seeking was higher for adults who perceived their health as poor. In addition, they more often have a risk factor for cardiovascular diseases, co-morbidities and/or obesity compared with overweight adults without risk factors for cardiovascular diseases, which matches the guidelines for obesity. For the group of individuals who are ready to lose weight, obesity prevention initiatives should focus on monitoring weight change and providing weight loss plans and timely referrals for obesity management. Moreover, many people are not ready to lose weight. For this group, strategies for behaviour change may depend on weight related health risk, perceptions of weight and dietitians, educational level and marital status. Obesity prevention initiatives should focus on increasing their awareness of the seriousness of their condition and offer individually appropriate weight management programmes.

Competing interests
This research was funded by the Dutch Ministry of Health, Welfare and Sport. There are no conflicts of interest.

Authors' contributions
All authors were involved in the conception and design of the study and in the acquisition and interpretation of data. JT performed the statistical analyses and drafted the paper. All authors have critically reviewed the manuscript and have approved the final version submitted for publication.

Acknowledgments
We would like to thank Anne Brabers and Margreet Reitsma-van Rooijen for critically reviewing the questionnaire and for their help in data collection.

References

1. World Health Organization. Obesity, situation and trends. Geneva: WHO, 2013.
2. Statistics Netherlands. More People Overweight. The Hague: Statistics Netherlands; 2012 [cited January 8, 2014]. Available from: http://www.cbs.nl/en-GB/menu/themas/gezondheid-welzijn/publicaties/artikelen/archief/2012/2012-3651-wm.htm .
3. World Health Organization. Obesity and overweight. Fact sheet N°311. Geneva: WHO, 2013.
4. Seidell JC, de Beer JJ, Kuijpers T. Guideline 'Diagnosis and treatment of obesity in adults and children'. NedTijdschrGeneeskd. 2008;152(38):2071-6.
5. Tol J, Swinkels ICS, de Bakker DH, Seidell JC, Veenhof C. Dietetic treatment lowers body mass index in overweight patients: an observational study in primary health care. J Hum Nutr Diet. 2013.
6. Andersen RM. Revisiting the behavioral model and access to medical care: does it matter? JHealth SocBehav. 1995;36(1):1-10.
7. Mackenbach JP, Stronks K. Volksgezondheid en gezondheidszorg [Public health and healthcare]. Amsterdam: Reed Business; 2012.
8. de Graaf-Ruizendaal WA, Kenens RJ, de Bakker DH. Vraag Aanbod Analyse Monitor – Verantwoording rekenmodellen versie 3.1 [Demand Supply Analysis Monitor - Explaining mathematical models version 3.1]. Utrecht: NIVEL; 2012.
9. Prochaska JO. Decision making in the transtheoretical model of behavior change. MedDecisMaking. 2008;28(6):845-9.
10. Weiss EC, Galuska DA, Khan LK, Serdula MK. Weight-control practices among U.S. adults, 2001-2002. AmJPrevMed. 2006;31(1):18-24.
11. Zapka J, Lemon SC, Estabrook B, Rosal MC. Factors related to weight loss behavior in a multiracial/ethnic workforce. EthnDis. 2009;19(2):154-60.
12. Holt DT, Helfrich CD, Hall CG, Weiner BJ. Are you ready? How health professionals can comprehensively conceptualize readiness for change. JGenInternMed. 2010;25 Suppl 1:50-5.
13. Wee CC, Davis RB, Phillips RS. Stage of readiness to control weight and adopt weight control behaviors in primary care. JGenInternMed. 2005;20(5):410-5.
14. Weiss AR. Characteristics of successful weight reducers: a brief review of predictor variables. AddictBehav. 1977;2(4):193-201.

15. Crocker J. A1. The public perception of the role of dietitians compared with physiotherapists and radiographers. Journal of Human Nutrition and Dietetics. 2000;13(5):363-71.
16. Gorton D, Gibbons M, Brown R. Initial expectations and perceptions of weight-loss clients visiting private-practice dietitians and the expectations their dietitians perceive they have. Journal of the New Zealand Dietetic Association. 2004;58(1):11-5.
17. Brabers AEM, Reitsma-van Rooijen M, de Jong JD. Consumentenpanel Gezondheidszorg: basisrapport met informatie over het panel [The Dutch Health Care Consumer Panel: basic report with information about the panel]. Utrecht: NIVEL; 2012.
18. The Dutch Health Care Consumer Panel. About the panel. Utrecht: NIVEL; 2013 [cited 2013]. Available from: http://www.nivel.nl/dossier/about-panel .
19. Central committee on research involving human subjects. Act of 26 February 1998, containing rules on medical research involving human subjects. [cited October 3, 2013]. Available from: http://www.ccmo.nl/attachments/files/wmo-engelse-vertaling-29-7-2013-afkomstig-van-vws.pdf .
20. Bursac Z, Gauss CH, Williams DK, Hosmer DW. Purposeful selection of variables in logistic regression. SourceCodeBiolMed. 2008;3:17.
21. Heshka S, Anderson JW, Atkinson RL, Greenway FL, Hill JO, Phinney SD, et al. Weight loss with self-help compared with a structured commercial program: a randomized trial. JAMA. 2003;289(14):1792-8.
22. Tham M, Young D. The role of the General Practitioner in weight management in primary care--a cross sectional study in General Practice. BMCFamPract. 2008;9:66.
23. Mertens IL, Van Gaal LF. Overweight, obesity, and blood pressure: the effects of modest weight reduction. ObesRes. 2000;8(3):270-8.
24. Yu-Poth S, Zhao G, Etherton T, Naglak M, Jonnalagadda S, Kris-Etherton PM. Effects of the National Cholesterol Education Program's Step I and Step II dietary intervention programs on cardiovascular disease risk factors: a meta-analysis. AmJClinNutr. 1999;69(4):632-46.
25. Teixeira PJ, Silva MN, Mata J, Palmeira AL, Markland D. Motivation, self-determination, and long-term weight control. Int J Behav NutrPhysAct. 2012;9:22.

26. Galuska DA, Will JC, Serdula MK, Ford ES. Are health care professionals advising obese patients to lose weight? JAMA. 1999;282(16):1576-8.
27. Brabers AEM, Reitsma-van Rooijen M, de Jong JD. Barometer Vertrouwen in de gezondheidszorg [Ratings of healthcare trust]. Utrecht: NIVEL; 2013. Available from: http://www.nivel.nl/consumentenpanel .
28. Pampel FC, Krueger PM, Denney JT. Socioeconomic Disparities in Health Behaviors. Annu Rev Sociol. 2010;36:349-70.
29. Dinour L, Leung MM, Tripicchio G, Khan S, Yeh MC. The Association between Marital Transitions, Body Mass Index, and Weight: A Review of the Literature. J Obes. 2012;2012:294974.
30. van Genugten L, van Empelen P, Oenema A. From weight management goals to action planning: identification of a logical sequence from goals to actions and underlying determinants. J Hum Nutr Diet. 2012;25(4):354-64.
31. Statistics Netherlands. Lifestyle, preventive screening, personal characteristics. The Hague: Statistics Netherlands; 2012. Available from: http://statline.cbs.nl/StatWeb/publication/?VW=T&DM=SLEN&PA=81177ENG&LA=EN .
32. Ezzati M, Martin H, Skjold S, Vander HS, Murray CJ. Trends in national and state-level obesity in the USA after correction for self-report bias: analysis of health surveys. JRSocMed. 2006;99(5):250-7.

Appendix 1 Questionnaire about your lifestyle and your opinion of dietary treatment

A.	Questions about your background
1	What is your date of birth? (day – month – year)
2	Are you a men or a women? ❑ Men ❑ Women

B.	Questions about your lifestyle
3.	How many days a week do you exercise for at least 30 minutes per day? This may be spread over the day, in units of 10 minutes. Exercise is defined as any physical activity which raises your heart rate and increases your breathing. ❑ 0 days a week ❑ 1 day a week ❑ 2 days a week ❑ 3 days a week ❑ 4 days a week ❑ 5 days a week ❑ 6 days a week ❑ 7 days a week
	Weight
4.	What is your current height? __ __ __ centimetres
5.	What is your current weight? If you are pregnant, please report your pre-pregnancy weight. __ __ __ kilograms
6.	To what extent do you agree with the following statement: I believe I am too heavy. ❑ Strongly disagree ❑ Somewhat disagree ❑ Somewhat agree ❑ Strongly agree
7.	Do you plan to start losing weight? ❑ No ❑ Yes, I'm planning to change but not in the short term ❑ Yes, I'm planning to change during the next month ❑ Yes, I am currently changing

8. What are the most important reasons you're not planning to lose weight, or at least not in the short-term? We would like to ask you to fill out three reasons maximum.
   - ❑ I would like to gain weight
   - ❑ I believe I have a healthy weight
   - ❑ I'm satisfied with my current weight
   - ❑ I've already lost weight
   - ❑ I don't really care about being overweight
   - ❑ I'm not sure how to approach it
   - ❑ I can't, because I have too many physical complaints
   - ❑ It'll cost me too much effort
   - ❑ I would have to give up too much
   - ❑ I didn't succeed previously
   - ❑ I get too little support from my environment (such as support from family/friends)
   - ❑ I can't combine it with my work/family commitments
   - ❑ I can't afford it
   - ❑ I don't want to spend money on it
   - ❑ Other reason, namely…

   → *Continue to part C, unless "Yes,…" was reported at question 7*

Weight loss method

9. You have previously mentioned having plans to start losing weight. What are your weight loss plans? Multiple responses are allowed.
   - ❑ Individual (healthier diet, more exercise)
   - ❑ Diet from a book, magazine from the internet
   - ❑ Meal replacements
   - ❑ Diet pills
   - ❑ Surgery (for example gastric bypass surgery)
   - ❑ Support via internet (for example websites, chat, App)
   - ❑ Support from courses (for example weight watchers)
   - ❑ Support from a care provider (for example general practitioner, dietitian)
     → *Continue to questions 10 and 11.*
   - ❑ I don't know (yet)

   → *Continue to part C, unless "Support from a care provider" was filled-out at question 9*

10. How would you like to receive weight loss support from a care provider? If you currently receive support from a care provider, what method is applied? Multiple responses are allowed.
    - ❑ Group sessions
    - ❑ One on one consultations (individual support)
    - ❑ E-mail, chat or text
    - ❑ Phone
    - ❑ Other method, namely…
    - ❑ I don't know (yet)

11. From which care provider would you like to receive weight-loss support?
    - ❑ General practitioner
    - ❑ Practice nurse
    - ❑ Dietitian
    - ❑ Weight consultant
    - ❑ Lifestyle coach
    - ❑ Nurse
    - ❑ Psychologist
    - ❑ Multiple care providers
    - ❑ Other care provider, namely: .....
    - ❑ I don't know (yet)

C. Your opinion of dietary treatment

A diet consists of rules on what foods you may or may not eat. Many diets exist. A diet can be followed independently or with help from a care provider. For many individuals, diets are radical and difficult to maintain. During dietary treatment, clients will be encouraged to continue with the diet.

12. Have you ever received dietary treatment from a care provider?
    - ❑ No
    - ❑ Yes
    - ❑ I don't know

13. Please indicate the extent to which you rate the following care providers as qualified to give dietary advice?

	Very Unqualified	*Somewhat unqualified*	*Somewhat qualified*	*Very qualified*	*I don't know*
a. General practitioner	❑	❑	❑	❑	❑
b. Practice nurse	❑	❑	❑	❑	❑
c. Dietitian	❑	❑	❑	❑	❑
d. Weight consultant	❑	❑	❑	❑	❑
e. Lifestyle coach	❑	❑	❑	❑	❑
f. Nurse	❑	❑	❑	❑	❑
g. Psychologist	❑	❑	❑	❑	❑

14. Do you know what a dietitian does?
    - ❑ Not at all → *Continue to question 18*
    - ❑ Slightly
    - ❑ Largely
    - ❑ Fully

15. We would like to know about your expectations of dietitians. Please indicate the extent to which you agree with the following expectations of dietitians.

I expect that a dietitian …	*Totally disagree*	*Slightly*	*Largely*	*Fully agree*
a. is a food and nutrition specialist	❑	❑	❑	❑
b. will deliver good quality of care	❑	❑	❑	❑
c. will **mainly** talk about the types of foods that are no longer allowed	❑	❑	❑	❑
d. will give personal dietary advice	❑	❑	❑	❑
e. will formulate goals which are discussed with the patient	❑	❑	❑	❑
f. will support a patient to achieve his or her goa	❑	❑	❑	❑
g. will help a patient **to become** motivated	❑	❑	❑	❑
h. will help a patient **to remain** motivated	❑	❑	❑	❑
i. will help a patient to stick to a diet	❑	❑	❑	❑

16. Please indicate the extent to which you agree that dietitians are better in comparison with other care providers or diet methods?

The dietitian is better since he or she…	*Totally disagree*	*Slightly*	*Largely*	*Fully agree*	*I don't know*
a. delivers better quality of care	❑	❑	❑	❑	❑
b. gives individual dietary advice	❑	❑	❑	❑	❑
c. helps a patient to remain motivated	❑	❑	❑	❑	❑

17. Please give a report mark between 1 and 10 for your trust in dietitians?

____

18. Please indicate whether you have had any of the following diseases, health conditions or complaints in the past 12 months? Multiple responses are allowed.
    - ❑ I did not have any diseases or health conditions
    - ❑ Diabetes type 2
    - ❑ Heart diseases/conditions
    - ❑ High blood pressure
    - ❑ High blood sugar
    - ❑ Diseases of the joints

6

Factors associated with the number of consultations per dietetic treatment: an observational study

Published as:
Tol J, Swinkels IC, Spreeuwenberg PM, Leemrijse CJ, de Bakker DH, Veenhof C. Factors associated with the number of consultations per dietetic treatment: an observational study. BMC health services research. 2012;12:317.

Abstract

Background Greater understanding of the variance in the number of consultations per dietetic treatment will increase the transparency of dietetic healthcare. Substantial inter-practitioner variation may suggest a potential to increase efficiency and improve quality. It is not known whether inter-practitioner variation also exists in the field of dietetics. Therefore, the aims of this study are to examine inter-practitioner variation in the number of consultations per treatment and the case-mix factors that explain this variation.

Methods For this observational study, data were used from the National Information Service for Allied Health Care (LiPZ). LiPZ is a Dutch registration network of allied health care professionals, including dietitians working in primary healthcare. Data were used from 6,496 patients who underwent dietetic treatment between 2006 and 2009, treated by 27 dietitians working in solo practices located throughout the Netherlands. Data collection was based on the long-term computerized registration of healthcare-related information on patients, reimbursement, treatment and health problems, using a regular software program for reimbursement. Poisson multilevel regression analyses were used to model the number of consultations and to account for the clustered structure of the data.

Results After adjusting for case-mix, seven percent of the total variation in consultation sessions was due to dietitians. The mean number of consultations per treatment was 4.9 and ranged from 2.3 – 10.1 between dietitians. Demographic characteristics, patients' initiative and patients' health problems explained 28% of the inter-practitioner variation. Certain groups of patients used significantly more dietetic healthcare compared to others, i.e. older patients, females, the native Dutch, patients with a history of dietetic healthcare, patients who started the treatment on their own initiative, patients with multiple diagnoses, overweight, or binge eating disorder.

Conclusions Considerable variation in number of consultations per dietetic treatment is due to dietitians. Some of this inter-practitioner variation was reduced after adjusting for case-mix. Further research is necessary to study the relation between inter-practitioner variation and the effectiveness and quality of dietetic treatment.

Background

Nowadays, dietitians are working in many countries throughout the world. Although countries can differ in the proportion of dietitians in the population and in professional qualifications, they all share the aim that dietitians should provide effective treatments based on scientific evidence about appropriate nutritional care in health and disease [1]. Several clinical studies have shown that treatment by a dietitian can be effective [2-6]. However, these studies were performed in small settings with specific groups of patients. To evaluate the effectiveness of dietetic treatment, large monitoring studies in public health and primary care settings are needed [7]. Transparency to all aspects of dietetic treatment is a prerequisite for the success of studies on effectiveness. Transparency can be increased, for example by focusing on inter-practitioner variation in dietetic treatment. Inter-practitioner variation in primary health care settings has been studied for several years. Many studies have shown that substantial inter-practitioner variation may suggest a potential to increase efficiency and improve quality [8-11]. It is not known whether inter-practitioner variation also exists in the field of dietetics. Multiple aspects of dietetic treatment can be used to examine inter-practitioner variability, such as the number of consultations per treatment.

In general, variation in the number of consultations per treatment can occur on different levels, e.g. that of the organization, therapists and patients. First, on the level of the organization variation may be due to the organization's treatment policy, the work environment, or cost and reimbursement issues [12]. Second, variation due to therapists may be attributable to differences between dietitians in professional experience, communication skills, expertise in effecting behavioral change, and beliefs about dietetic counseling [13-16]. These differences can influence the therapeutic decision-making process and the ability to teach patients new knowledge, skills and perception [17]. Third, variation on patient level may be due to demographics, health status [18, 19] or behavioral issues, including locus of control, socio-environmental factors, intentions and motivation [20]. Patients with complex health problems are probably in need of more dietetic

healthcare. Consequently, they are more likely to have a history of dietetics. Dutch dietitians expected patients with multiple diagnoses, psychological problems, or communication problems to be associated with a higher consultation rate [21]. However, case-mix effects have not been studied in relation to the number of consultations per dietetic treatment.

More knowledge about variation in consultation sessions might help to eliminate unwanted variation (e.g. variation not explained by disease, patient preference or evidence based medicine) in treatment. This could contribute towards improving the quality of dietetics and reducing unnecessary healthcare costs. Accordingly, the aims of this quantitative study are: 1) to examine the inter-practitioner variation in the number of consultations per treatment; 2) to determine the association between the number of consultations per treatment and case-mix variables.

Methods

Study design

For this longitudinal observational study, data were used from the National Information Service for Allied Health Care (LiPZ). LiPZ is a Dutch national registration network for allied healthcare professionals [22], including registered dietitians (RDs) working in primary healthcare. Relevant information on the organization of dietetics in the Netherlands is provided in Appendix 1.

LiPZ participants

Recruitment started in 2005 by contacting 42 RDs who had indicated an interest in participating in LiPZ according to a previous questionnaire-based study of a representative sample of 500 Dutch primary health care working dietitians. Additionally, an announcement about participation in LiPZ was placed on the website of the software program (Evry) frequently used by dietetic practices. RDs were included if they recorded patient, treatment, and reimbursement information (see Appendix 1) in the software program Evry. No exclusion criteria were applied in order to participate. A total of 27 RDs working in solo practices were enrolled. This sample size accounts for 3% of

the total population of Dutch dietitians working in private practices and is sufficient in order to be representative for practice region, and level of urbanicity. When drop-outs occurred, it was intended to keep the network as representative as possible. Therefore, new dietitians were invited and if possible selection was based on practice region and level of urbanicity. The reason for dropping out was often because participating was too time-consuming. In return for participating, the RDs received among others a financial compensation and points for accreditation in the quality register.

LiPZ data collection

Information about the dietitians' demographics was collected by a self-reported questionnaire at the time of enrollment. Patient data collection was based on extractions from electronic medical records. The records consisted of long-term computerized registration of healthcare-related information. Dietitians recorded all data needed for reimbursement routinely, e.g. patient's age and gender and dates of consultation. Furthermore, a special LiPZ-module was installed in the software program to register supplementary information on patient's treatment, for example on educational level, history in dietetics, health problems and initiative of treatment. Information on initiative of treatment was collected as dietitians were accessible only via referral by a physician (see Appendix 1). However, it was possible that patients could have initiated treatment by, for example asking for a referral to a dietitian.

Data were submitted by the participants on a monthly basis. After submitting new data, standardized quality control checks on missing or inconsistent data were carried out by research assistants. Consequently, the participants received an overview of the missing or inconsistent data and were asked to complete or adjust data accordingly. Ethical approval for this study was not required, since the patients received customary care without experimental interventions. Nevertheless, the Dutch Data Protection Authority was notified. In addition, pursuant to the Personal Data Protection Act data were collected anonymously; patients were informed about the LiPZ study by posters and leaflets in the practice waiting rooms, and they could opt not to participate in the study.

Study sample and outcome

The study sample was based on data from LiPZ. Between 1 January 2006 and 1 January 2010, 8,320 new patients within 27 solo practices completed dietetic treatment. The data were collected at the level of a consultation and consultations were clustered within one treatment. One treatment includes all patients' consultations for the same health problem. For this study, patient records with missing values were excluded (n=1,824). The total number of consultations (face-to-face contact) per dietetic treatment was used as the outcome of this study. Table 1 explains the measurement of the case-mix variables used in this study.

Table 1: Measurement of case-mix variables used in this study

Variables	Measurement	Used in analyses as categorical:
Patients' demographics (model 1)		
Gender		Male [a]; Female
Age	Date of birth	Continuous: years of age at start of the treatment.
Ethnicity	Patient's origin	Immigrant [a], from a non-western country, i.e. Turkey, Africa, Latin-America and Asia ; Native Dutch, including western immigrants originally form Europe, North-America, Oceania, Indonesia, Japan.
Educational level	Highest level of education	Low (Primary school) [a]; Medium (Secondary- or higher education); High (University); Other (not specified, e.g. in children).
Urbanicity	Zip-code of the address	High (≥ 1500 addresses per km²); Medium (1000-1499 addresses per km²); Low (< 999 addresses per km²).
History in Dietetics	The patient had previous dietetic health care in the past 5 years.	Referrer [a]; Patient
Patients' initiative (model 2)		
Initiative treatment	The patient was referred to the dietitian initiated by the referrer or the patient.	Referrer [a]; Patient.
Patients' health (model 3)		
Communication problem	According to the dietitian	No [a], Yes.
Psychiatric problem	According to the dietitian	No [a], Yes.
Intellectual disability problem	According to the dietitian	No [a], Yes.
Multiple diagnoses	Number of diagnoses per patient (max. 4)	Single diagnosis [a], multiple diagnosis
Overweight	Type of diagnosis according to the dietitian	No [a] ; Yes.
Underweight/ unwanted weight loss	Type of diagnosis according to the dietitian	No [a] ; Yes.
Hypercholes-terolemia	Type of diagnosis according to the dietitian	No [a] ; Yes.
Diabetes	Type of diagnosis according to the dietitian	No [a] ; Yes.
Food intolerance	Type of diagnosis according to the dietitian	No [a] ; Yes.
Irritable Bowel Syndrome	Type of diagnosis according to the dietitian	No [a] ; Yes.
Binge eating disorder	Type of diagnosis according to the dietitian	No [a] ; Yes.
Overweight & Diabetes;	Type of diagnosis according to the dietitian	No [a] ; Yes.
Overweight & Hypertension	Type of diagnosis according to the dietitian	No [a] ; Yes.
Overweight & Hypercholesterolemia	Type of diagnosis according to the dietitian	No [a] ; Yes.
Overweight & Diabetes & Hypercholesterolemia	Type of diagnosis according to the dietitian	No [a] ; Yes.
Overweight & Diabetes & Hypertension	Type of diagnosis according to the dietitian	No [a] ; Yes.
Overweight & Binge eating disorder	Type of diagnosis according to the dietitian	No [a] ; Yes.
Overweight & Irritable Bowel Syndrome	Type of diagnosis according to the dietitian	No [a] ; Yes.
Therapists' demographics (model 4)		
Gender		Male [a]; Female
Age	Date of birth	Continuous: years of age at start of the study.

[a] These categories were used as reference group.

Statistical analyses

The characteristics of the patients and the dietitians were analyzed using descriptive statistics in STATA (version 11, 2009, STATACorp, College Station Texas). Categorical variables were presented as percentages, and continuous variables were presented as mean values with standard deviations or median values with interquartile range (IQR) for non-normally distributed variables.

The data were analyzed using multilevel poisson regression analyses in MLwiN (Version 2.15, 2009, Centre for Multilevel Modelling, University of Bristol) [25, 26]. Multilevel analyses were used to take into account the structure of the data: patients were nested within dietitians. The model therefore consists of two levels: the patient level (level 1) and the dietitian level (level 2). Because the outcome variable was a count variable, poisson regression was performed [27]. Several models were developed to fit the data, namely: model 0) the intercept-only model; model 1) patients' demographics; model 2) which included the variables of model 1 and patients' initiative; model 3) which included variables of model 2 variables on patients' health; model 4) which included the variables of model 3 and therapists' demographics.

The analyses were carried out in several steps. First, the variance partition coefficient (VPC) was calculated for all models to express the inter-practitioner variation [26]. The VPC on dietitian level indicates the influence of the dietitians on consultation sessions that cannot be explained by the model parameters. Secondly, the proportional change in variance estimates of the different models was calculated. This indicates the part that case-mix factors explain concerning the total inter-practitioner variation [26]. The variance estimate is similar to the R2 in traditional regression, except that it focuses on specific level variance and not on total variance. Finally, regression coefficients, standard errors and p-values were calculated for all variables in model 4, to examine the association between the number of consultations per treatment and case-mix factors. A P-value of ≤ 0.05 was considered to be statistically significant.

Results

Almost all dietitians in this study were female (n=25). The majority of the patients were female, native Dutch, had second-level education and lived in a highly urbanized area. Descriptive characteristics of the therapists and patients are presented in Table 2. The raw number of consultations per treatment varied between patients from 1-56 consultations, with a median of 4 and IQR of 2-7 consultations per treatment.

Table 2: Descriptive statistics and poison multilevel regression-analysis of case-mix variables on consultation sessions (n=6,496)

	Descriptive	*Poisson regression*		
	Mean±sd [a] Percentages	Regression coefficient	SE [b]	P-value
Intercept		-0.72	0.07	
Patients' demographics				
Female (reference male)	65.2 %	0.09	0.02	<0.001
Age (years)	44.8±19.1	-0.00	0.00	0.002
Native ethnicity (reference immigrants)	88.5 %	0.11	0.04	0.003
Educational level:				
Low (reference)	31.3 %			
Medium	42.2 %	-0.08	0.02	<0.001
High	23.7 %	-0.08	0.03	0.002
Not specified	2.9 %	-0.05	0.06	0.422
Urbanicity:				
Low	34.8 %	0.02	0.03	0.476
Medium	24.9 %	-0.03	0.03	0.284
Strong (reference)	39.9 %			
History in dietetics (reference no history)	22.3%	0.14	0.02	<0.001
Patients' initiative				
Start treatment initiated by the patient (reference by referrers initiative)	14.5 %	0.13	0.03	0.024
Patients' health				
Communication problem (reference no communication problems)	3.9 %	-0.02	0.05	0.717
Psychiatric problem (reference no psychiatric problems)	9.2 %	0.12	0.03	<0.001
Intellectual disability problem (reference no problems with respect to intellectual disability)	2.0 %	0.06	0.07	0.385
Multiple diagnoses (reference single diagnosis)	52.0 %	0.36	0.05	<0.001
Overweight [c]	30.6 %	0.50	0.04	<0.001
Underweight, unwanted weight loss [c]	3.0 %	0.06	0.07	0.434
Hypercholesterolemia [c]	2.8 %	-0.33	0.09	<0.001
Diabetes Mellitus [c]	2.5 %	-0.04	0.09	0.672
Irritable Bowel Syndrome [c]	1.6 %	-0.15	0.10	0.132
Food intolerance [c]	0.6 %	-0.31	0.16	0.054
Binge eating disorder [c]	0.5 %	0.32	0.13	0.016
Overweight & Diabetes [c]	8.0 %	0.07	0.04	0.052
Overweight & Hypercholesterolemia [c]	4.8 %	-0.00	0.05	0.935
Overweight & Hypertension [c]	4.3 %	0.14	0.05	0.003
Overweight & Diabetes & Hypercholesterolemia [c]	4.3 %	0.04	0.05	0.444
Overweight & Diabetes & Hypertension [c]	3.2 %	0.14	0.06	0.015
Overweight & Binge eating disorder [c]	1.6 %	0.14	0.07	0.043
Overweight & Irritable Bowel Syndrome [c]	1.3 %	0.00	0.07	0.952
Therapists' demographics				
Age (years)	46.0±6.1	-0.01	0.01	0.539
Female (male)	93.6 %	0.60	0.30	0.048

[a] sd = standard deviation.

[b] SE = standard error.

[c] The reference group is having another diagnosis or a combination of diagnoses.

Inter-practitioner variation in the number of consultations per treatment

Without correcting for case-mix factors, the VPC on dietitian level was 10.4% (intercept only model). The inter-practitioner variation decreased to 7.1% after including case-mix factors into the model, i.e. demographics, patients' initiative and patients' health-related variables. This indicates the influence of dietitians on consultation sessions that cannot be explained by the model parameters (see Table 3). Adjusted for these variables, the mean number of consultations was 4.9 and varied between dietitians with a 95% coverage interval from 2.3 – 10.1 consultations per treatment.

The case-mix factors of this study explained 27.8% of the inter-practitioner variation. Most of this variation (11.3%) was explained by patients' demographics (model 1). The variation between dietitians' consultations was further explained by adding patients' initiative (3.8%), patients' health-related variables (2.5%), and therapist demographics (10.2%) to the model.

Table 3: Explaining inter-practitioner variation in the number of consultations per dietetic treatment

	Intercept only model	Model 1 [a]	Model 2 [b]	Model 3 [c]	Model 4 [d]
Variance estimate	0.1909	0.1694	0.1621	0.1573	0.1378
Proportional reduction in variance estimates compared to the intercept only model		11.3%	15.1%	17.6%	27.8%
Variance partitioning coefficient therapist level	10.4 %	9.0 %	8.6 %	8.2 %	7.1%

[a] Model 1 included patients' demographic variables.

[b] Model 2 included variables of model 1 + patients' initiative.

[c] Model 3 included variables of model 2 + patients' health-related variables.

[d] Model 4 included variables of model 3 + therapists' demographic variables.

Case-mix associated with the number of consultations per treatment

The association between the case-mix variables of model 4 and consultation sessions is presented in Table 2. Patient characteristics that were significantly associated with a higher number of consultations per treatment were: females, natives, patients who have had dietetic health care in the past, and patients who started the treatment by own initiative. Health related variables that were associated with a higher number of consultations per treatment were patients with: psychiatric problems, overweight, binge eating disorder, multiple diagnoses, overweight in combination with diabetes and hypertension, overweight and hypertension, overweight and binge eating disorder. Patients with hypercholesterolemia were significantly associated with having less consultations per treatment compared to patients with a different diagnosis. Other patient characteristics that were significantly associated with a lower number of consultations were older patients, and patients with a medium or high educational level compared to patients with a low educational level.

Discussion

The results show that considerable variation in number of consultations per treatment is due to dietitians. Seven percent of the total variance was concentrated at dietitian level. Compared to some other studies examining inter-practitioner variance, this percentage seems rather high [8, 19, 28-30]. In absolute terms, the mean number of consultations varied widely between dietitians, from 2.3 to 10.1 consultations per treatment. The inter-practitioner variance was partly (28%) explained by demographic characteristics, patients' initiative and patients' health problems. This is relatively high compared to studies in other professions [19, 31]. Therefore, when studying inter-practitioner variation on dietitian level it is important to adjust for case-mix factors. This is especially the case for demographic characteristics as the patient's health problems only explained 2.5% of the variation between dietitians in the number of consultations per treatment. The results from this study indicate that similar patients receive different dietetic care, which might raise questions for future studies. For example, whether there is under

or over-use of dietetic care resources and unnecessary health care costs. Therefore, future studies should focus on examining other kinds of inter-practitioner variance and whether this variance is appropriate or not. Appropriate variation might be related to the clinical health status of the patient [18]. Inappropriate variation might be due to non-medical factors, such as differences in counseling styles [15] or workload as small list sizes can be associated with high consultation rates [32]. Furthermore, high levels of inter-practitioner variation might raise questions about the quality of care, although the level of variation is not directly linked to the quality of care. Therefore, results of this particular study cannot be used to draw conclusions on the quality of dietetic treatment. Further research on consultation rate and the effectiveness and quality of dietetic treatment is necessary.

Demographic characteristics of the patients were associated with the number of consultations sessions. These results were in accordance with studies in other healthcare professions [19, 33, 34]. However, the positive association between patients' age and a lower number of consultations per treatment was not in accordance with other studies [19, 31]. Possibly, the expectations of elderly patients in terms of aims to achieve or personal wishes are lower compared to younger patients. Furthermore, immigrants were associated with having fewer consultations per treatment compared to the native Dutch population. This was not in accordance with the expectation of Dutch dietitians [21]. Ethnic background in itself cannot explain differences in healthcare use. However, language and cultural differences may be the underlying issue accounting for difference in healthcare utilization [35]. For example, if a dietitian is not aware of the cultural differences around food, he or she may give inappropriate dietary advice. This may be a reason for immigrants to quit dietetic treatment. Compared to other frequent diagnoses in this study, patients with overweight, binge eating disorder, or multiple diagnoses were strongly associated with using more consultations per treatment. This could be explained by the complexity of these health problems and underlying issues. No significant relation between consultation sessions and communication problems or intellectual disability was found. Possibly, a positive relation could be found in other health care settings, as this study sample consisted of dietitians working in general solo practices

not specialized in treating patients with communication problems or intellectual disability.

A strength of the study is the use of routine registration as facilitated by the LiPZ software. This meant the data was continuously collected with the software program that dietitians use for regular practice administration, and additional questions were completed by the RD during the consultation or shortly afterwards. Therefore, there is little risk for recall bias. Furthermore, minimal inaccuracies are expected regarding the outcome variable as the registration was based on reimbursement claims. Aside from the advantages, some limitations of the study should be taken into account when interpreting the results. There is a possibility that the participants working in solo practices constitute a subgroup of all Dutch dietitians working in private practice. However, there is no national information available about the number of dietitians working in private practices in the Netherlands. Additionally, the number of participating dietitians in this study was too small to study more therapist-related factors in order to explain inter-practitioner variation (n=27). Therefore more research is necessary with a larger number of practitioners. In the Dutch situation dietetic treatment is reimbursed by insurance companies for up to a maximum of four hours per calendar year. Therefore, the effect of reimbursement on consultation sessions was not taken into account. Probably reimbursement will play a large role in dietetic healthcare use in other countries, as in many countries dietetic treatment is not or only partly reimbursed by insurance companies [36-38]. Therefore the patient population of this study may differ from the patient population in other countries – e.g. on social economic status or motivation. As costs have a major impact on patient retention, it can be hypothesized that the patient's motivation increases when dietetic treatment is not reimbursed. More international research on these topics will increase the transparency of dietetic treatment in a more universal perspective.

Conclusion

In conclusion it was found that there is considerable variation in number of consultations per dietetic treatment which is due to dietitians. Some of this inter-practitioner variation was reduced after adjusting for case-mix. Further

research is necessary to study the relation between inter-practitioner variation and the effectiveness and quality of dietetic treatment.

Competing interests

This study has no competing interests. This work was performed by NIVEL, the Netherlands Institute for Health Services Research. A steering committee has been established in order to assist the NIVEL in executing the LiPZ project. Current members of the committee are representatives of the Dutch association of Dietitians (NVD), the Royal Dutch Society for Physical Therapy (KNGF), the association of Cesar and Mensendieck therapists (VvOCM), and the Dutch Health Insurers association (ZN). In addition, the committee can receive advice from the college of Dutch Health Insurers (CvZ), and the Dutch Healthcare Authority (NZa).

Authors' contributions

JT, IS, CL, CV were involved in het conception of the research question. JT and PS were involved in analysing the data. All authors contributed to the interpretation of the data. JT drafted the manuscript, which was reviewed and approved by all authors.

Acknowledgements

We would like to thank the contribution of the study's research assistants and the study participants. This study was funded by the Dutch Ministy of Health, Welfare and Sport.

References

1. International Confederation of Dietetic Associations. Dieticians around the world, their education and their work. 2008.
2. Arcand JA, Brazel S, Joliffe C, Choleva M, Berkoff F, Allard JP, et al. Education by a dietitian in patients with heart failure results in improved adherence with a sodium-restricted diet: a randomized trial. Am Heart J. 2005;150(4):716.
3. Huang MC, Hsu CC, Wang HS, Shin SJ. Prospective randomized controlled trial to evaluate effectiveness of registered dietitian-led diabetes management on glycemic and diet control in a primary care setting in Taiwan. Diabetes Care. 2010;33(2):233-9.
4. Nasser R, Cook SL, Dorsch KD, Haennel RG. Comparison of two nutrition education approaches to reduce dietary fat intake and serum lipids reveals registered dietitians are effective at disseminating information regardless of the educational approach. J Am Diet Assoc. 2006;106(6):850-9.
5. Sneve J, Kattelmann K, Ren C, Stevens DC. Implementation of a multidisciplinary team that includes a registered dietitian in a neonatal intensive care unit improved nutrition outcomes. Nutr Clin Pract. 2008;23(6):630-4.
6. Welty FK, Nasca MM, Lew NS, Gregoire S, Ruan Y. Effect of onsite dietitian counseling on weight loss and lipid levels in an outpatient physician office. Am J Cardiol. 2007;100(1):73-5.
7. Dietitians of Canada. Moving forward. Role of the registered dietitian in primary health care: a national perspective. 2009.
8. Davis P, Gribben B, Lay-Yee R, Scott A. How much variation in clinical activity is there between general practitioners? A multi-level analysis of decision-making in primary care. J Health Serv Res Policy. 2002;7(4):202-8.
9. de Jong JD, Groenewegen PP, Spreeuwenberg P, Schellevis F, Westert GP. Do guidelines create uniformity in medical practice? Soc Sci Med. 2010;70(2):209-16.
10. Fung V, Schmittdiel JA, Fireman B, Meer A, Thomas S, Smider N, et al. Meaningful variation in performance: a systematic review. Medical Care. 2010;48(2):140-8.

11. Selby JV, Schmittdiel JA, Lee J, Fung V, Thomas S, Smider N, et al. Meaningful variation in performance: what does variation in quality tell us about improving quality? Med Care. 2011;48 (2):133-9.
12. Westert GP, Groenewegen PP. Medical practice variations: changing the theoretical approach. Scand J Public Health. 1999;27(3):173-80.
13. Barr SI, Yarker KV, Levy-Milne R, Chapman GE. Canadian dietitians' views and practices regarding obesity and weight management. J Hum Nutr Diet. 2004;17(6):503-12.
14. Campbell K, Crawford D. Management of obesity: attitudes and practices of Australian dietitians. Int J Obes Relat Metab Disord. 2000;24(6):701-10.
15. Lok KY, Chan RS, Sea MM, Woo J. Nutritionist's variation in counseling style and the effect on weight change of patients attending a community based lifestyle modification program. Int J Environ Res Public Health. 2010;7(2):413-26.
16. Rapoport L. Integrating cognitive behavioural therapy into dietetic practice: a challenge for dietitians. Journal of Human Nutrition and Dietetics. 1998;11(3):227-38.
17. Day JL. Diabetic patient education: determinants of success. Diabetes Metab Res Rev. 2000;16 Suppl 1:S70-4.
18. de Jong J. Explaining medical practice variation: social organization and institutional mechanisms. Utrecht: NIVEL, 2009.
19. Swinkels IC, Wimmers RH, Groenewegen PP, van den Bosch WJ, Dekker J, van den Ende CH. What factors explain the number of physical therapy treatment sessions in patients referred with low back pain; a multilevel analysis. BMC Health Serv Res. 2005;24(5):74.
20. Spahn JM, Reeves RS, Keim KS, Laquatra I, Kellogg M, Jortberg B, et al. State of the evidence regarding behavior change theories and strategies in nutrition counseling to facilitate health and food behavior change. J Am Diet Assoc. 2010;110(6):879-91.
21. Leemrijse CJ, de Bakker DH. Dieetadvies uit de AWBZ: aanloopproblemen de moeite waard [No longer reimbursement for dietary advice by the National Act on Exceptional Medical Expenses (AWBZ): run in problems worth it]? Nederlands Tijdschrift voor Diëtisten. 2006;61:107-12.
22. Swinkels ICS. Monitoring physiotherapy using a national registration network. Utrecht: NIVEL; 2008.

23. Nederlandse Vereniging van Diëtisten. Statistieken NVD [Statistics of the Dutch Dietetic Association]. Houten: NVD; 2011 [cited January 27, 2012]. Available from: http://www.nvdietist.nl/content.asp?kid=10529458
24. The Ministry of Health Welfare and Sport. Primary health care in The Netherlands. The Hague: 2005.
25. Diez Roux AV. A glossary for multilevel analysis. J Epidemiol Community Health. 2002;56(8):588-94.
26. Merlo J, Yang M, Chaix B, Lynch J, Rastam L. A brief conceptual tutorial on multilevel analysis in social epidemiology: investigating contextual phenomena in different groups of people. J Epidemiol Community Health. 2005;59(9):729-36.
27. Stryhn H, Sanchez J, Morley P, Booker C, Dohoo IR. Interpretation of variance parameters in multilevel Poisson regression models: In Proceedings of the 11th International Symposium on Veterinary Epidemiology and Economics; 2006 [cited 2011]. Available from: http://www.sciquest.org.nz .
28. Harman JS, Cuffel BJ, Kelleher KJ. Profiling hospitals for length of stay for treatment of psychiatric disorders. J Behav Health Serv Res. 2004;31(1):66-74.
29. Hofer TP, Hayward RA, Greenfield S, Wagner EH, Kaplan SH, Manning WG. The unreliability of individual physician "report cards" for assessing the costs and quality of care of a chronic disease. Jama. 1999;281(22):2098-105.
30. van den Berg MJ, de Bakker DH, Westert GP, van der Zee J, Groenewegen PP. Do list size and remuneration affect GPs' decisions about how they provide consultations? BMC Health Serv Res. 2009;9:39.
31. Kersnik J, Svab I, Vegnuti M. Frequent attenders in general practice: quality of life, patient satisfaction, use of medical services and GP characteristics. Scand J Prim Health Care. 2001;19(3):174-7.
32. Groenewegen PP, Hutten JB. Workload and job satisfaction among general practitioners: a review of the literature. Soc Sci Med. 1991;32(10):1111-9.
33. Britt HC, Valenti L, Miller GC. Determinants of consultation length in Australian general practice. Med J Aust. 2005;183(2):68-71.
34. Robson T, Blackwell D, Waine C, Kennedy RL. Factors affecting the use of dietetic services by patients with diabetes mellitus. Diabet Med. 2001;18(4):295-300.
35. Uiters E. Primary health care use among ethnic minorities in the Netherlands. A comparative study. Utrecht: NIVEL, 2007.

36. Monash institute of health service research. Simplifying the mechanics of client care under medicare for dietitians in private practice: an evaluation of dietetics medicare services for chronic disease management. 2008.
37. New Zealand Dietetic Association. Appointment with a dietitian [cited 2010]. Available from: https://www.dietitians.org.nz/appointment-with-a-dietitian .
38. The Flemish Professional Association of Nutritionists and Dietitians. Terugbetaling ziekenfondsen [Health care reimbursement by private insurers]. 2007 [cited 2010]. Available from: http://www.vvvd.be/professionals/docu_professionals/2007/aangepaste%20versie%20terugbetaling%20-maart%202008%20.doc .

Appendix 1: Organization of dietetics in The Netherlands

In 2009, about 45% of all Dutch registered dietitians (RD) worked in primary health care and 60% of them worked in private practice [23].

All Dutch citizens have to buy standardized individual primary health insurance coverage from a private insurer, and the government of the Netherlands subsidies so that primary health insurance is affordable for everyone.

Since January 1st 2005, dietetic treatment was reimbursed by the standardized primary health insurance coverage for up to a maximum of four hours per calendar year (January 1st - December 31st), under the condition that the patient had a medical indication and was referred by a physician. This reimbursement includes the direct treatment time, i.e. the total time of the consultation with the patient, and the indirect treatment time, i.e. the time the dietitian needs to administer and prepare the patient's consultation. For a higher premium a patient can buy extra coverage, for extra treatment time or unlimited reimbursement of dietetic treatment [24]. All reimbursement also covers treatment for overweight and obesity.

The Dutch situation has changed in 2011. Since August 2011 dietetic health care is accessible without a referral from a physician. From January 2012 dietetic health care will only be reimbursed by the standardized individual primary health insurance coverage for up to a maximum of four hours a year, under the condition that the patient receives integrated care and is diagnosed with diabetes mellitus, chronic obstructive pulmonary disease or has a cardiovascular risk.

7

Dietetic treatment lowers body mass index in overweight patients: An observational study in primary health care

Published as:
Tol J, Swinkels ICS, de Bakker DH, Seidell JC, Veenhof C. Dietetic treatment lowers body mass index in overweight patients: an observational study in primary health care. J Hum Nutr Diet. 2014; 27(5):426-33.

Abstract

Background Greater insight into the effectiveness of usual dietetic care will contribute to the ongoing development of dietetic services. The present study examined the change in body mass index (BMI) in overweight patients following dietetic treatment in primary care, the sources of variability and factors associated with BMI change.

Methods This population-based observational study was based on data from a Dutch registration network of dietitians in primary health care. Data were derived from electronic medical records concerning 3,960 overweight adult patients (BMI≥25) who received usual care from 32 registered dietitians between 2006 and 2012. Multilevel linear regression analyses were conducted.

Results Patients' BMI significantly ($p<0.001$) decreased by 0.94 kg/m² on average during treatment. An additional reduction of 0.8 kg/m² was observed in patients treated for longer than six months. BMI decreased by 0.06 kg/m² for each additional unit in initial BMI above 31.6. Most (97%) variability in BMI change was attributed to patients and 3% to dietitians. Part of the variance between patients (11%) and dietitians (30%) was explained by patient socio-demographic characteristics, nutrition-related health aspects, initial body weight and treatment duration.

Conclusions Dietetic treatment in primary care lowers BMI in overweight patients. Patients' change in BMI was rather similar between dietitians. Greater BMI reductions were observed in those with a high initial BMI and those treated for at least six months. Future research is necessary to study long-term effects of weight loss after treatment by primary health care dietitians, especially since many patients drop out of treatment prematurely.

Introduction

Obesity is a worldwide epidemic [1]. Obesity rates are among the highest in the USA. In 2009-2010, 33.3% of US adults were overweight and 35.9% were obese [2]. Obesity rates vary between European countries [3]. In the Netherlands, 36% of the adult population was overweight and almost 12% was obese in 2011 [4]. Being overweight and obese are major risk factors for noncommunicable diseases, such as cardiovascular diseases and diabetes [5]. Consequently, the total healthcare costs attributed to overweight and obesity are high [6, 7]. For these reasons, it is important that treatment results in positive health outcomes. Evidence suggests that 5-10% of weight loss is associated with meaningful improvements in health-related risk factors, such as serum lipids, glucose tolerance and blood pressure [8, 9].

Many studies have investigated the effect of diets or dietary counselling on weight loss [10, 11]. However, little research has been conducted to examine the influence of the dietitian on weight loss. Some randomized studies have shown that patients who receive dietary counselling from a dietitian achieve significantly larger weight loss when compared to either other providers [12-16], or other methods [17]. A limitation of these studies is that the results are based on the effectiveness of a single dietitian, whereas there might be differences between dietitians that could lead to different weight loss outcomes [18]. Another possible weakness of experimental intervention studies on weight loss is that they might represent a maximum treatment effect because of the optimized conditions and participants' high levels of motivation [19]. Therefore, more studies in 'real life' situations are recommended, such as in a primary health care setting, to observe the outcome of dietetic treatment and to investigate whether there are differences between dietitians. Furthermore, research is needed to study the factors associated with weight loss in dietetic practice. Although many studies have identified factors associated with weight loss, such as self-monitoring, self-efficacy, social support, or motivation, [20] some of the previously defined factors associated with weight loss may be specifically related to healthy people and to the type of weight loss strategy employed.

The present study aimed to determine the empirically observed change in body mass index (BMI) in overweight patients after dietetic treatment in primary health care. Additional objectives were to explore sources of variability and factors associated with BMI change, such as patient sociodemographic characteristics, nutrition-related health aspects, initial body weight and treatment duration. Accordingly, this study examines the effect of dietetic treatment in primary care on: 1) overweight patients' mean change in body mass index; 2) the sources of variability in overweight patients' change in BMI; 3) factors associated with overweight patients' change in BMI.

Methods

Registration network: sampling

Data were derived from the electronic medical records of dietitians who participated in the National Information Service for Allied Health Care (LiPZ). LiPZ is a Dutch computerized registration network for allied health care professionals [21]. It includes approximately 30 registered dietitians working in private practices in primary health care. According to the Dutch Dietetic Association, in January 2011, about 55% of all Dutch dietitians worked in a primary healthcare setting, such as a private practice or home care. The network has been collecting data on dietetic health care on a continuous basis since 2006.

For the LiPZ study, dietitians were recruited in 2005, via advertisements on the website of specific software used by dietitians (EVRY; Ensemble, Zoetermeer, the Netherlands). In addition, dietitians were recruited via a previous questionnaire-based study conducted among a representative sample of 500 primary care dietitians for the purpose of measuring their interest in participating in LiPZ. To be eligible for participation, the dietitians had to be working in a private practice in the Netherlands and use Evry (Ensemble) software for the administration of patient, treatment, and reimbursement information. No exclusion criteria were applied. The dietitians were representative of the Dutch population of dietitians in

primary care with respect to practice region and level of urbanicity [22, 23]. For participating in LiPZ, the dietitians received financial remuneration, points for accreditation in the quality register for dietitians, and benchmark data updates on an annual basis.

Registration network: data collection

The participating dietitians registered data on all their patients using Evry (Ensemble) software, as is frequently used for patient administration by Dutch dietitians in private practice. The software program was designed to record relevant information on patients' treatments, as well as particulars related to reimbursement (i.e. date and time of consultations). An additional module was installed in the software program specifically for LiPZ. Dietitians were instructed to register information in this module at the start and at the end of patients' treatment. Patient data collection was based on extractions from this software. Data were collected at consultation level and were submitted on a monthly basis. The data were entered into the database after standardized quality control checks on missing or inconsistent data. The participants received an overview of the missing or inconsistent data and were asked to complete or adjust the data accordingly. Corrected data were included in the next-month submitted datafile, and were adjusted in the database accordingly.

For the present study, ethical approval was not required in the Netherlands because the patients were receiving customary care from dietitians, and no experimental interventions were involved (for more information about patients' dietetic treatment, see Table 1). The Dutch Data Protection Authority was informed about the LiPZ study. Pursuant to the Personal Data Protection Act, data were collected anonymously, patients were informed about the LiPZ study by leaflets and posters in the waiting rooms of the practices, and patients could opt not to participate in the LiPZ study.

Table 1: Information about patients' dietetic treatment

Dietary advice
Dutch dietitians work according to the principles of the nutrition care process, which includes nutrition assessment, diagnosis, intervention, and monitoring/evaluation. The current study did not collect information on patients' dietary intake or on dietetic advice. However, Dutch dietitians are expected to give nutritional advice based on the Dutch dietary guidelines. The guidelines advise patients to make food choices that promote health and help prevent disease, using an energy restricted diet of 600 kcal less than the estimated normal intake.
Treatment duration
Treatment duration varies between patients and between dietitians. In general, the initial visit takes 45 to 60 minutes of direct treatment time. Follow-up visits take 15 to 30 minutes. One-to-one consultations were the most common form of contact. The guidelines recommend treatment for at least one year, followed by a less intensive period of continuous care for weight maintenance.
Treatment reimbursement
At the time of this study, dietetic treatment was reimbursed by Dutch standardized primary health insurance for up to a maximum of four hours per calendar year. This reimbursement covers direct treatment time, i.e. the total length of the consultation, and indirect treatment time, i.e. the time the dietitian needs to administer and prepare the consultation.

Study outcome and independent variables

The outcome of this study (dependent variable) was patients' change in BMI (BMI at the end of treatment minus BMI at the start of treatment). Participating dietitians registered patients' body weight and height in the software Evry (Ensemble). BMI was calculated electronically and extracted from the software Evry (Ensemble).

The independent variables (see Table 2) were measured at the start of treatment. Dietitians recorded data on the patient's age, gender, level of education and whether the patient had received dietetic healthcare in the past 5 years. In addition, data were registered on communication problems (e.g. language barriers), psychological problems (including binge-eating disorder), intellectual disability or cardiovascular risk factors. A cardiovascular risk factor was defined as being overweight and having diabetes, hypertension or hypercholesterolemia. Not having a cardiovascular

risk factor was defined as being overweight with or without another diagnosis. Medical diagnoses were registered by the dietitian and were based on medical information obtained during the nutrition care process. A maximum of four diagnoses per patient were registered, based on a specially developed reference guide for dietitians [24]. Further independent variables used in this study were BMI at treatment start and the duration of a treatment episode. The duration of treatment was based on the difference between a patient's first and last consultation date. An algorithm was created to define an episode of treatment. The treatment was considered as closed when the dietitian entered a reason for ending treatment in the software Evry (Ensemble), or when the time between the last consultation date and the last date on which information was supplied to LiPZ was longer than 6 months. LiPZ data showed that in only 1% of the patients did a gap of at least six months occur between two successive consultations.

Table 2: Socio-demographic, health and treatment characteristics of patients with complete and missing data on BMI at treatment end

	Complete data (n=3,960)	**Missing BMI (n=2,277)**	***P-value***
Age in years			
mean ± sd	50.1 ± 15.2	48.7 ± 14.8	<0.001
Gender *(%)*			0.444
Male	36.2%	35.2%	
Female	63.8%	64.8%	
Educational level *(%)*			0.210
Low	29.0%	27.1%	
Medium	45.7%	47.6%	
High	25.2%	25.3%	
Previous dietetic treatment *(%)*			0.906
No	79.8%	79.6%	
Yes	20.3%	20.4%	
Psychological problem *(%)*			0.067
No	92.6%	91.3%	
Yes	7.4%	8.7%	
Intellectual disability problem *(%)*			0.021
No	98.0%	98.8%	
Yes	2.0%	1.2%	
Cardiovascular risk factor *(%)*			<0.001
No (single diagnosis)	39.4%	43.4%	
No (diagnosis other than diabetes, hypertension or hypercholesterolemia)	11.1%	13.2%	
Yes (diabetes, hypertension or hypercholesterolemia)	49.5%	43.4%	
BMI at treatment start			
mean ± sd	31.5 ± 4.7	32.3 ± 5.2	<0.001
Treatment duration *(%)*			0.283
0 – 6 months	62.3%	63.2%	
7 – 12 months	22.8%	20.9%	
1 – 1.5 years	7.2%	7.6%	
1.5 years +	7.7%	8.4%	

Study sample

The clustered convenience sample of this longitudinal observational study was based on data from 8294 overweight (BMI≥25 kg/m²) adult (>18 years) patients who were treated by 32 dietitians between 1 January 2006 and 1 January 2012. Included were data from dietitians who participated for at least 6 months in LiPZ and registered sufficient data on BMI, i.e. had complete data on BMI for at least 10% of their patients. Overall, nine dietitians (who treated 511 patients) did not meet the inclusion criteria and two patients were excluded due to extreme outcome values.

Statistical analyses

For the purpose of the present study, data were aggregated to patients' episodes of treatment. Descriptive analyses were performed in STATA, version 12.1 (STATACorp, College Station TX, USA). The research questions were analysed with multilevel linear regression analyses in MLwiN, version 2.25 (Centre for Multilevel Modelling, University of Bristol, Bristol, UK). Multilevel analyses were conducted to account for the clustered two-level structure of the data (i.e. dietitians and patients' treatment episodes). Five models were developed to explore the sources of variability in change in BMI, namely: model 0 (intercept-only model); model 1 (adjusted for age, gender, educational level, and previous dietetic treatment); model 2 (adjusted for the variables of model 1 and communication problems, psychological problems, intellectual disability and cardiovascular risk factors); model 3 (adjusted for the variables of model 2 and BMI at treatment start); model 4 (adjusted for the variables of model 3 and treatment duration). All continuous variables were centered at the mean and tested for linearity. Total variance estimates at patient and dietitian level were calculated for all models. Furthermore, regression coefficients, standard errors and P-values were calculated for the variables of model 4, aiming to test the factors that were associated with a change in body mass index. $P \leq 0.05$ was considered statistically significant. Analyses were performed on patients with complete data.

Results

Sample size

Included in the present study were 8294 overweight adult patients of whom 6237 had complete data on independent variables. The percentage of missing data on the dependent variable varied widely between dietitians, from 4.1% to 83.3% (n=32). The results are shown for patients with complete data of both dependent and independent variables (n=3960). The patients with complete data were significantly different with respect to age, intellectual disability, cardiovascular risk factors, and mean BMI at treatment start compared to patients with missing data on BMI at the end of treatment (Table 2).

Mean change in body mass index

At treatment start 43.5% of patients were overweight and 56.5% were obese. At the end of dietetic treatment 6.2% had a healthy BMI <25 kg/m², 48.3% were overweight and 45.5% were obese. During dietetic treatment patients' BMI significantly (P <0.001) decreased by 0.94 kg/m² on average, adjusted for patient sociodemographic characteristics, nutrition-related health aspects, initial body weight and treatment duration (model 4).

Sources of variability in change in body mass index

Adjusted for the variables of model 4, the average reduction in BMI varied between dietitians from -1.41 kg/m² to -0.62 kg/m² (P <0.001) (Fig. 1). The proportion of the total variance explained in BMI change (the intraclass correlation coefficient) was 0.974 at the patient level and 0.026 at dietitian level. This means that approximately 3% of the variance in BMI change was explained by dietitians. The total variance at patient and dietitian level decreased when more variables were included in the analyses (Table 3). Compared to the intercept-only model, 10.5% of the variance between patients and 29.8% of the variance between dietitians was explained by the variables of model 4 (P <0.01). Most of the variance in BMI change was explained by treatment duration.

Figure 1: Variation between dietitians in patients' mean BMI change with 95% confidence interval, adjusted for socio-demographic characteristics, nutrition-related health aspects, initial body weight and treatment duration (n=3,960)

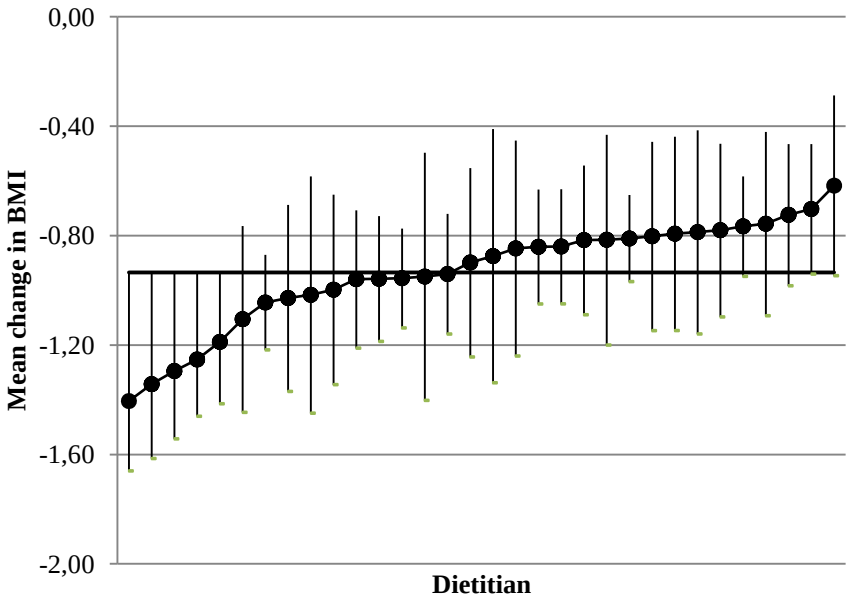


Table 3: Proportion of variance explained in multiple regression models on patients BMI change after dietetic treatment (n=3,960)

	Dietitian level % (variance estimate)	**Patient level** % (variance estimate)
Intercept only model	(0.084)	(2.494)
Model 1) age, gender, educational level, previous dietetic treatment	-0.0% (0.084)	-0.2% (2.489)
Model 2) communication problems, psychological problems, intellectual disability, cardiovascular risk factors.	-0.0% (0.084)	-0.7% (2.471)
Model 3) body mass index at treatment start	+1.2% (0.085)	-3.3% (2.389)
Model 4) treatment duration	-30.6% (0.059)	-6.3% (2.239)
Total	**-29.8%**	**-10.5%**

Factors associated with a change in body mass index

Overweight patients with cardiovascular risk factors or other diagnoses (e.g. irritable bowel syndrome, gastro-oesophageal reflux or chronic obstructive pulmonary disease) had significantly smaller reductions in BMI compared to patients with overweight alone (Table 4). In addition, significantly smaller BMI reductions were observed in patients with psychological problems compared to those without psychological problems and in patients who were treated previously by a dietitian compared to patients who were not treated previously by a dietitian.

The relationship between treatment duration and change in BMI was not linear. Therefore, treatment duration was categorized into four groups. Reductions of -0.8 kg/m² were observed in patients treated longer than 6 months compared to patients with a treatment duration of < 6 months.

Each unit increase in BMI above 31.6 kg/m² at treatment start was significantly associated with an additional reduction of 0.06 kg/m² at treatment end. Further linear multilevel analyses were performed to put this result into perspective. Data were subdivided into three groups of patients, i.e. overweight (BMI 25 – 29.9 kg/m²), obese (BMI 30 – 34.9 kg/m²) and extremely obese (BMI≥ 35 kg/m²) at treatment start. Adjusted for patient sociodemographic characteristics, nutrition-related health aspects, initial body weight and treatment duration, BMI significantly (P <0.001) decreased by 0.73 kg/m² on average in overweight patients, by 0.90 kg/m² in obese patients and by 1.49 kg/m² in extremely obese patients (data not shown in Table 4).

Table 4: Factors associated with change in body mass index in 3,960 overweight patients treated by 32 primary health care dietitians. Results from linear multilevel regression-analysis adjusted for socio-demographic characteristics, nutrition-related health aspects, initial body weight and treatment duration

	regression coefficient (kg/m^2)	**standard error**	**P-value**
Age in years			
(reference mean)	-0.002	0.002	0.181
Gender			
Male *(reference)*			
Female	-0.039	0.052	0.461
Educational level			
Low *(reference)*			
Medium	-0.015	0.060	0.799
High	-0.131	0.071	0.065
Previous dietetic treatment			
No *(reference)*			
Yes	0.251	0.062	<0.001
Communication problems			
No *(reference)*			
Yes	0.071	0.143	0.618
Psychological problems			
No *(reference)*			
Yes	0.192	0.094	0.040
Intellectual disability			
No *(reference)*			
Yes	0.349	0.184	0.058
Cardiovascular risk factor			
No (single diagnosis) *(reference)*			
No (diagnosis other than diabetes, hypertension or hypercholesterolemia)	0.254	0.083	0.002
Yes (diabetes, hypertension or hypercholesterolemia)	0.162	0.061	0.008
BMI at treatment start			
(reference mean)	-0.056	0.005	<0.001
Treatment duration			
0 – 6 months *(reference)*			
7 – 12 months	-0.835	0.059	<0.001
1 – 1.5 years	-0.829	0.096	<0.001
1.5 years+	-0.862	0.095	<0.001
Intercept	**-0.935**	**0.092**	**<0.001**

Discussion

This is one of the first studies in a primary healthcare setting to observe that treatment given by dietitians results in a significant BMI reduction of -0.94 kg/m² on average. These results are comparable to another study in primary health care, where a reduction of 1.14 kg/m² was found [16]. Furthermore, the results show that 3% of the variance in patients' mean BMI change can be attributed to differences between dietitians. This is relatively low compared to other studies in primary health care [25]. Low proportional variances have often been interpreted as indicating little potential for quality improvement efforts. However, a study by Selby et al. showed that even low proportional variances can mask clinically important differences across practitioners [26]. Therefore, the absolute amount of variation, expressed in clinically meaningful units, is important in interpreting the results. Because adjusted results for average BMI change in the current study ranged from -1.41 to -0.62 kg/m² between dietitians, many patients do not achieve clinically relevant outcomes of treatment. For example, BMI reductions of 1.41 and 0.62 kg/m² are equivalent to reductions of 4.5% and 2.0% in weight (based on the average BMI of 31.6 at the start of this study and the average height of 181 cm in Dutch males and 168 cm in Dutch females [4, 27]. The effects on change in BMI were modest as patients who dropped out of treatment were also included. For example, 12% of the patients ended treatment after only one consultation (data not shown). Even though the change in BMI was modest, it may still contribute to the improvement of cardiovascular risk factors, [28] and possibly to other outcomes valued by the patient, such as perceived quality of life or satisfaction with treatment [29]. Therefore, future studies should also focus on patient-centered outcomes of dietetic treatment. Another important issue is whether weight losses are more or less well maintained. More research is necessary to study the long-term effect of weight loss after treatment by primary health care dietitians.

Part of the variance in BMI change between patients and between dietitians was explained by the independent variables in the study. Most of the variance in BMI change was explained by treatment duration. There was no

linear relationship between treatment duration and BMI reduction. Similar changes in BMI were observed in patients with a treatment duration longer than 12 months, compared to patients with a treatment duration between 6 and 12 months. Possibly, BMI reductions remain quite similar over time because the maintenance phase will help prevent patients from regaining weight after 12 months. This result was inconsistent with a systematic review of dietary counselling interventions for weight loss, showing that almost all trials reported steady weight regain over time during the maintenance phase [11]. Further research is necessary to study the long-term effect of weight loss after treatment by primary health care dietitians, especially since many patients stopped treatment within the first year. High drop-out rates are commonly seen in obesity management. Drop-out may be attributable to having a fulltime job, family problems, unsatisfactory results, or a lack of motivation [30, 31]. Overall, more knowledge about predictors of drop-out in dietetic practice may help reduce drop-out and increase the effectiveness of dietetic treatment.

In agreement with previous studies, a higher initial BMI was associated with greater reduction in BMI [32]. This may be because energy reduction is easier to implement in heavier individuals who typically have a higher initial energy intake, leading to greater total energy deficit.

Further results of the present study showed that patients who were previously treated by a dietitian were associated with smaller reductions in BMI. These patients may have a history of dieting failure, and therefore dietitians focus less on calorie restriction and more on improvements in lifestyle for chronic disease risk reduction [33]. Furthermore, patients with psychological problems were associated with smaller reductions in BMI, as is supported by other research [20]. Patients with cardiovascular risk factors or other co-morbidities were also significantly associated with smaller reductions in BMI. It is possible that these patients use medication that negatively influences weight loss [34]. Caution is needed in interpreting our findings on BMI change since there was a relatively high number of patients with missing data. Missing data could be related to the dietitian or to the patient. One possibility is that missing data on BMI change was due to poor

registration of end variables by dietitians in general since the percentage of missing data on BMI change ranged from 4.1% to 83.3% between dietitians. In addition, missing data on BMI change could be due to no-show of patients with disappointing weight loss results. Sensitivity analyses were performed to estimate the possible influence of disappointing BMI changes for those with incomplete data on the results of the study. Three imputation methods were used for patients with missing data on BMI change. The results for all three sensitivity analyses were essentially the same. Patients' mean change in BMI and the total explained variance in changed BMI between patients and their dietitians could at the most be slightly overestimated. The factors associated with a change in BMI were comparable to complete case analyses, although regression coefficients and standard errors were slightly lower (results not shown).

A strength of this study is that the data were based on actual dietetic treatments of patients in primary health care because the data were entered by the dietitian in a software program used for regular practice administration and reimbursement. Additionally, data were continuously collected on a large number of patients. Another strength is that additional questions for the study were completed by the dietitian during the consultation or shortly afterwards. Therefore, there is little risk of recall bias.

Conclusion

Dietetic treatment in primary healthcare lowers BMI in overweight patients. Patients' change in BMI was rather similar between dietitians. Greater BMI reductions were observed in those with a high initial BMI and those treated for at least 6 months. Future research is necessary to study the long-term effect on weight loss after treatment by primary health care dietitians, especially since many patients drop out of treatment prematurely.

Acknowledgments

There are no conflicts of interest. We would like to thank the study participants for their contribution.

Conflict of interests, source of funding and authorship
The authors declare that there are no conflicts of interest. This research was funded by the Dutch Ministry of Health, Welfare and Sport. All authors were involved in the conception and design of the study and in the interpretation of data. D.H. de B., C.V., I.C.S. and J.T. were involved with data collection. D.H. de B. obtained funding for the study and J.T. performed data analysis and drafted the paper. All authors critically reviewed the article and have approved the final version submitted for publication.

References

1. World Health Organization. Obesity: preventing and managing the global epidemic. Report of a WHO consultation. Geneva: WHO, 2012.
2. National Center for Health S. Health, United States, 2011: With Special Feature on Socioeconomic Status and Health. Hyattsville (MD)2012. Table 69 p.
3. Branca F, Nikogosian H, Lobstein T. The challenge of obesity in the WHO European Region and the strategies for response. Geneva: World Health Organization, 2007.
4. Statistics Netherlands. More People Overweight. The Hague: Statistics Netherlands; 2012 [cited January 8, 2014]. Available from: http://www.cbs.nl/en-GB/menu/themas/gezondheid-welzijn/publicaties/artikelen/archief/2012/2012-3651-wm.htm .
5. World Health Organization. Obesity and overweight. Fact sheet N°311. Geneva: WHO, 2013.
6. Wang Y, Beydoun MA, Liang L, Caballero B, Kumanyika SK. Will all Americans become overweight or obese? estimating the progression and cost of the US obesity epidemic. Obesity (Silver Spring). 2008;16(10):2323-30.
7. Wang YC, McPherson K, Marsh T, Gortmaker SL, Brown M. Health and economic burden of the projected obesity trends in the USA and the UK. Lancet. 2011;378(9793):815-25.
8. Mertens IL, Van Gaal LF. Overweight, obesity, and blood pressure: the effects of modest weight reduction. ObesRes. 2000;8(3):270-8.
9. Yu-Poth S, Zhao G, Etherton T, Naglak M, Jonnalagadda S, Kris-Etherton PM. Effects of the National Cholesterol Education Program's Step I and Step II dietary intervention programs on cardiovascular disease risk factors: a meta-analysis. AmJClinNutr. 1999;69(4):632-46.
10. Avenell A, Brown TJ, McGee MA, Campbell MK, Grant AM, Broom J, et al. What are the long-term benefits of weight reducing diets in adults? A systematic review of randomized controlled trials. J Hum Nutr Diet. 2004;17(4):317-35.
11. Dansinger ML, Tatsioni A, Wong JB, Chung M, Balk EM. Meta-analysis: the effect of dietary counseling for weight loss. Ann Intern Med. 2007;147(1):41-50.

12. Croft PR, Brigg D, Smith S, Harrison CB, Branthwaite A, Collins MF. How useful is weight reduction in the management of hypertension? J R Coll Gen Pract. 1986;36(291):445-8.
13. Delahanty LM, Sonnenberg LM, Hayden D, Nathan DM. Clinical and cost outcomes of medical nutrition therapy for hypercholesterolemia: a controlled trial. J AmDietAssoc. 2001;101(9):1012-23.
14. Diaz RG, Esparza-Romero J, Moya-Camarena SY, Robles-Sardin AE, Valencia ME. Lifestyle intervention in primary care settings improves obesity parameters among Mexican youth. J AmDietAssoc. 2010;110(2):285-90.
15. Nybacka A, Carlstrom K, Stahle A, Nyren S, Hellstrom PM, Hirschberg AL. Randomized comparison of the influence of dietary management and/or physical exercise on ovarian function and metabolic parameters in overweight women with polycystic ovary syndrome. Fertil Steril. 2011;96(6):1508-13.
16. Willaing I, Ladelund S, Jorgensen T, Simonsen T, Nielsen LM. Nutritional counselling in primary health care: a randomized comparison of an intervention by general practitioner or dietician. EurJ CardiovascPrevRehabil. 2004;11(6):513-20.
17. Raatz SK, Wimmer JK, Kwong CA, Sibley SD. Intensive diet instruction by registered dietitians improves weight-loss success. J Am Diet Assoc. 2008;108(1):110-3.
18. Lok KY, Chan RS, Sea MM, Woo J. Nutritionist's variation in counseling style and the effect on weight change of patients attending a community based lifestyle modification program. Int J Environ Res Public Health. 2010;7(2):413-26.
19. Glasgow RE, Lichtenstein E, Marcus AC. Why don't we see more translation of health promotion research to practice? Rethinking the efficacy-to-effectiveness transition. Am J Public Health. 2003;93(8):1261-7.
20. Elfhag K, Rossner S. Who succeeds in maintaining weight loss? A conceptual review of factors associated with weight loss maintenance and weight regain. ObesRev. 2005;6(1):67-85.
21. Swinkels ICS. Monitoring physiotherapy using a national registration network. Utrecht: NIVEL; 2008.
22. Leemrijse CJ, Swinkels ICS, Veenhof C, de Bakker D. Jaarboek LiPZ 2006 & 2007, beroepsgroep diëtetiek, gegevensverzameling binnen vrijgevestigde praktijken voor diëtetiek [Annual report LiPZ 2006 & 2007, dietetics

occupational group, data collection on dietitians working in private practices in primary health care]. Utrecht: NIVEL, 2008.

23. Tol J, Swinkels ICS, de Bakker DH, Veenhof C. Jaarcijfers en Trendcijfers 2008-2010 dietetiek, gegevensverzameling binnen vrijgevestigde praktijken voor diëtetiek [Annual Statistics and Trends 2008-2010 Dietetics, Data Collection on Dietitians Working in Private Practices in Primary Health Care]. Utrecht: NIVEL; 2012.
24. The Dutch Dietetic Association. Artsenwijzer diëtetiek, hoofdstuk werkwijze diëtist [Doctor's reference guide to dietetics, chapter dietitian working methods]. Houten: NVD; 2013 [cited July 1, 2013]. Available from: http://www.artsenwijzer.info/site/?page=7&lg=en .
25. Fung V, Schmittdiel JA, Fireman B, Meer A, Thomas S, Smider N, et al. Meaningful variation in performance: a systematic review. Medical Care. 2010;48(2):140-8.
26. Selby JV, Schmittdiel JA, Lee J, Fung V, Thomas S, Smider N, et al. Meaningful variation in performance: what does variation in quality tell us about improving quality? Med Care. 2011;48 (2):133-9.
27. Statistics Netherlands. Dutch population taller and heavier The Hague: Statistics Netherlands; 2012 [cited 2013 1 July]. Available from: http://www.cbs.nl/en-GB/menu/themas/gezondheid-welzijn/publicaties/artikelen/archief/2012/2012-3746-wm.htm?Languageswitch=on .
28. Wing RR, Lang W, Wadden TA, Safford M, Knowler WC, Bertoni AG, et al. Benefits of modest weight loss in improving cardiovascular risk factors in overweight and obese individuals with type 2 diabetes. Diabetes Care. 2011;34(7):1481-6.
29. Jackson JA, Kinn S, Dalgarno P. Patient-centred outcomes in dietary research. JHumNutrDiet. 2005;18(2):83-92.
30. Dalle Grave RD, Suppini A, Calugi S, Marchesini G. Factors associated with attrition in weight loss programs. Int J Behav Consult Ther. 2006;2(3):341-53.
31. Inelmen EM, Toffanello ED, Enzi G, Gasparini G, Miotto F, Sergi G, et al. Predictors of drop-out in overweight and obese outpatients. Int J Obes(Lond). 2005;29(1):122-8.
32. Finkler E, Heymsfield SB, St-Onge MP. Rate of Weight Loss Can Be Predicted by Patient Characteristics and Intervention Strategies. JAmDietAssoc. 2011.

33. Ikeda JP, Lyons P, Schwartzman F, Mitchell RA. Self-reported dieting experiences of women with body mass indexes of 30 or more. JAmDietAssoc. 2004;104(6):972-4.
34. Dutch Institute for Health Improvement (CBO). Guideline diagnostics and treatment of obesity in adults and children (in Dutch: Richtlijn diagnostiek en behandeling van obesitas bij volwassenen en kinderen) Utrecht: Van Zuiden Communications; 2008.

8

Patients' experiences and satisfaction with dietetic treatment: results from a Dutch survey

Authors:
Tol, J., Swinkels, I.C.S., de Bakker, D.H., Seidell, J.C., Veenhof, C.

Abstract

Background Knowledge about patient experience of dietetic treatment and aspects related with patient satisfaction may help to improve the quality of dietetic treatment. The objective of this study is to determine patients' experiences of dietetic treatment and the aspects related with it, secondly, to explore the extent to which patients' expectations and experiences are associated with overall satisfaction with dietetic services.

Methods Patients who receive or have received dietary treatment from a dietitian were questioned on their experiences with dietetic health care and their satisfaction with the dietitian. In September 2012, 1,500 members of the Dutch Health Care Consumer Panel were asked to fill-out the online questionnaire. This Panel was representative for the general population regarding age and sex.
The association between patient characteristics and scales expressing patients experiences with dietitians was analysed using linear regression. The association between expectations, experiences and overall satisfaction (dichotomous outcome) was examined using logistic regression analysis.

Results The response rate was 57%. 15.6% (n=134) of the respondents had received dietetic treatment, especially for weight management. Respondents generally report positive experiences with dietitians' communication skills, interpersonal skills, and actions to improve engagement and enablement. Almost half of the respondents did not report sufficient health benefits by dietetic treatment. Significantly ($p<0.01$) higher experience scores were reported by those who were treated for longer than 12 months. 70% of the respondents were satisfied with dietetic treatment. Respondents with met expectations and higher experience scores have significantly higher odds of satisfaction.

Conclusion Patient satisfaction with dietetic services increased by improving patients' expectations and experiences. There is potential for improvement of several aspects of dietetic care, especially regarding the health benefits of dietetic treatment.

Background

Dietitians can play a major role in educating and encouraging people's behavioural changes by using strategies that motivate individuals to initiate and maintain health behaviours [1]. Evaluation studies of dietetic treatment often focused on clinical outcomes, and patients' experiences of dietetic treatment were rarely involved [2]. Examining patients' satisfaction with the care they receive from dietitians and focusing on their experiences of dietetic treatment may give valuable information about the quality and outcome of care from a patient perspective.

In the literature, patient satisfaction is described as a multidimensional concept, based on a relationship between both expectations and experiences [3]. In theory, dissatisfaction results from unmet expectations and satisfaction increases as fulfilment exceeds expectations [4]. It is unclear if this relationship holds for the profession of dietetics, and if so, identifying areas where dietetic care is suboptimal and identifying factors associated with patients' experiences may improve patient satisfaction. Information on patient experience is important as highly satisfied patients are more likely to maintain appointments and adhere to treatment recommendations, all of which result in positive health outcome [5, 6].

Evaluation of patient satisfaction involves a diverse array of methodologies, including longitudinal surveys, in-depth interviews or focus-group discussions. There are few studies in the literature that have evaluated patient satisfaction with dietetic services. A Canadian study showed that patients were very satisfied with their visit at the dietitian [7]. However, they did not measure specific experiences with the dietitian. Several qualitative studies measured patients' views of dietetic consultations and showed that patients value good communication skills [8], elaboration on information and advice by dietitians, a nonprescriptive approach (e.g. guiding rather than instructing and allow the patient to set goals and targets) and collaboration (e.g. negotiating action plans) [9]. In addition, they value length of consultation and conversation techniques, the dietitian's expertise and effort, and to feel comfortable and being taken seriously [10]. In sum, several

studies have examined aspects of dietetic treatment that patients consider important; however, quantitative data are lacking.

Studies from other healthcare settings report multiple aspects that might influence patient experiences, such as socio-demographics, the health care organization and treatment aspects [11]. Quantitative results on patient experience can highlight aspects of care that can be improved, which may contribute to quality measurement and improvement of dietetic services. Therefore, the objective of this exploratory study is to examine patients' experiences of dietetic treatment and the aspects related with it, secondly, to determine the extent to which patients' expectations and experiences are associated with overall satisfaction with dietetic services.

Methods

Subjects

In September 2012, an online questionnaire was sent to 1,500 members of the Dutch Health Care Consumer Panel [12, 13]. The sample of panel members were representative, by age and gender, for the Dutch population aged 18 years and older, obtained by stratified random sampling from 6,000 panel members (aged 18+). About four times a year the panel members receive a questionnaire about healthcare related topics. General information was available concerning the participants (e.g. age, gender, level of education, net monthly household income in euros, and marital status) as these characteristics were documented upon entry into the panel and are updated regularly. Data were processed anonymously. The Dutch Health Care Consumer Panel is registered with the Dutch Data Protection Authority (no. 1262949, see for more information http://www.dutchdpa.nl/Pages/home.aspx). The study does not require ethical approval since it does not fall within the scope of the Medical Research Involving Human Subjects Act.

Questionnaire

For the purpose of this study several questions were developed (See Appendix 1) and included in a larger online survey [14]. Data were used

from respondents who receive or to have received dietary treatment from a dietitian (in this study described as patients).

The first part of the questionnaire consisted of general information . Additionally, self-reported weight and height were asked in order to calculate body mass index (BMI). The second part of the questionnaire measured four core dimensions: experiences with dietitians' communication and information, interpersonal skills, patient engagement and enablement and overall satisfaction. These items were based upon the only Dutch validated Consumer Quality Index (CQI) in the field of allied health care; the CQI for physical therapy [15]. Briefly, development of this CQI involved development of a research plan, qualitative research among patients and physical therapists; the questionnaire was redrafted and piloted extensively before the final version was produced. Furthermore, the questions on perceived health benefits were partly based on a validated satisfaction survey for outpatient dietetic services by Vivanti et al [16]. Slight modifications were applied to the questions in order to make them suitable for Dutch dietitians. Researchers of the Dutch Health Care Consumer Panel, the program committee of this Panel (e.g. the Ministry of Health, Welfare and Sport and the Federation of Patients and Consumer Organizations in the Netherlands) and the Dutch Association of dietetics commented on the questionnaire.

Outcome measures

Five outcome measures were used in this study. Four scales were developed that measured the four specific dimensions of patients experiences with dietitians': communication skills, interpersonal skills, engagement and enablement, and health benefits. Additionally, overall satisfaction with dietetic services was used as an outcome measure.

The four scales were developed by selecting thematically similar items. Items were excluded based on a standard procedure in order to maximize scale reliability [17]. Items were excluded from the scale when: 1) more than 20% of the participants responded "I don't know", "I don't remember" or "not applicable"; 2) not normally distributed (at least 90% of the frequency

in one category); 3) items of similar content were strongly correlated ($r>0.85$). Confirmatory factor analyses was used to examine the structure of the scales. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was higher than 0.70 and the eigenvalues of the factors were greater than one. The data demonstrated strong internal reliability with Cronbach alpha values of >0.80 in all domains. For each scale average scores were calculated [17]. Higher scores (range 1-4, with one decimal specific) indicated better experiences with dietitians.

Overall satisfaction with dietetic services was defined as a dichotomous variable (satisfied or not satisfied), using the question "How satisfied are you with your dietetic treatment?". Persons who answered "largely satisfied" or "totally satisfied" were defined as satisfied and those who answered "totally dissatisfied" or "somewhat satisfied" were defined as not satisfied.

Data analysis

Items on patients' experiences with dietitians were analysed by means of descriptive statistics (frequency distribution, percentages and means of all items).

The association between patient background characteristics, treatment characteristics and patients' experiences was analysed using bivariate linear regression, followed by four backward stepwise multivariate linear regression analyses (one for each scale). Covariates with $p<0.15$ in bivariate analysis were selected for inclusion in the multivariate model since more traditional levels may fail to identify variables known to be important [18]. Covariates were then removed from the model if they were non-significant ($p<0.05$).

The association between expectations, experiences and overall satisfaction was examined using bivariate logistic regression analysis. Odds ratios and 95% CIs were calculated. Data were analysed in STATA (version 13).

Results

Response

The response rate was 57% (n=861). The respondents were significantly older compared to the non-responders (mean age 54.5 ± 14.6 versus 49.4 ± 16.3, $p<0.001$). There were no significant differences between respondents' gender (p=0.427) and educational level (p=0.376) compared to the non-responders.

General information about dietetic treatment

One out of five respondents have received dietary advice from a healthcare provider, at some point in their lives (21.3%, n=181). The results in this study are based on respondents who receive or have received dietary advice from a dietitian (15.6%, n=134).

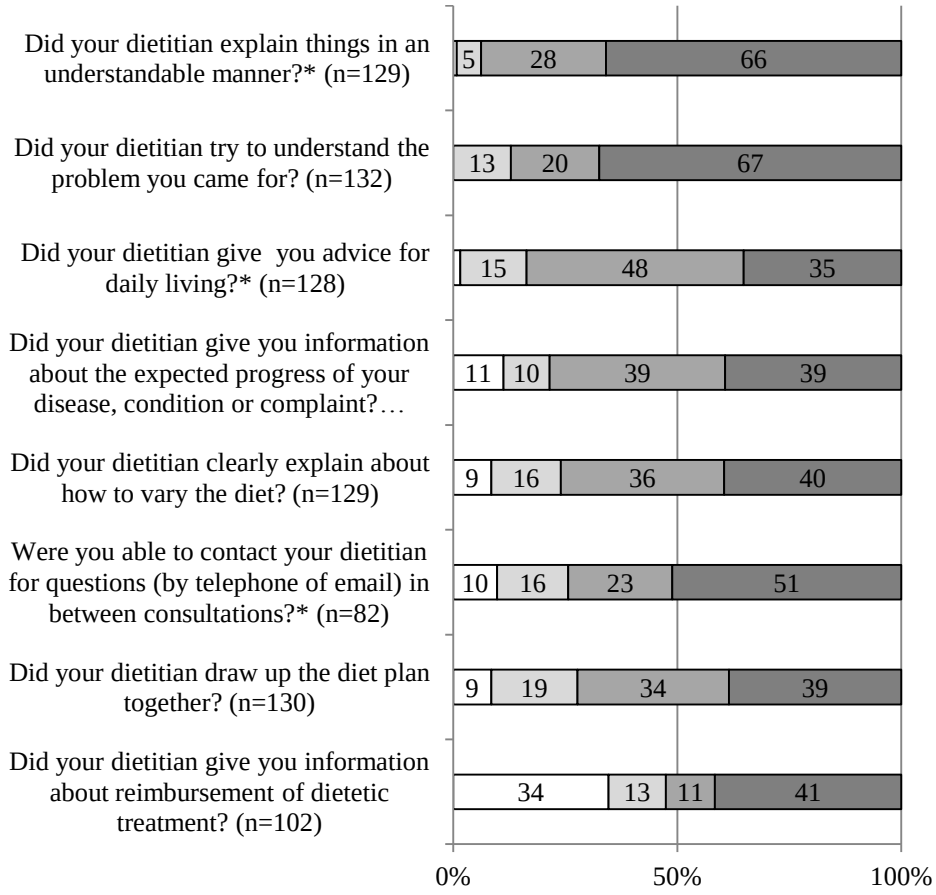
At the time of this study, 19 of the 134 respondents were still in dietetic treatment. Most respondents reported that dietetic treatment took place over a year ago (73.9%). The respondents who have visited a dietitian were aged between 26 and 79 years. Most were female with an advanced level of education, and were treated in a primary healthcare setting (85.5%) for individual consultations. The majority was treated for weight-related conditions, i.e. 80.2% was overweight (BMI≥25). Most respondents ended dietetic treatment within one year (74.1%) (Table 1).

Patients' experiences with dietitians' communication skills and received information

Overall, patients have positive experiences with dietitians' communication skills and the information they received during treatment. In five out of eight items, at least three-quarters of the patients reported to largely or completely agree with the statements. At least three-quarters reported that dietitians clearly explained things in an understandable manner (94%), that they tried to understand the problem they came for (87%), gave advice for daily living (84%), advised about the expected progress of the disease or complaint (79%), and clearly explained about how to vary the diet (76%) (Figure 1).

In the other three items, reported experiences were more negative than the other items. At least one-quarter of patients reported that they could not often contact the dietitian for questions in between consultations (26%), or reported that the dietitian did not draw up or hardly drew up the diet plan together (28%), or did not provide or hardly provided information about reimbursement of treatment (47%).

Figure 1: Patients' experiences with dietitians' communication skills and received information



* 4 point scale: never, sometimes, often, always.

Figure legend: no somewhat largely completely

Patients' experiences with dietitians' interpersonal skills

Patients report very positively on experiences with dietitians' interpersonal skills. The majority of patients reported that the dietitian always treated them polite (95%), took them seriously (81%), listened carefully (81%) and made them feel comfortable (76%) (Figure 2).

Figure 2: Patients' experiences with dietitians interpersonal skills

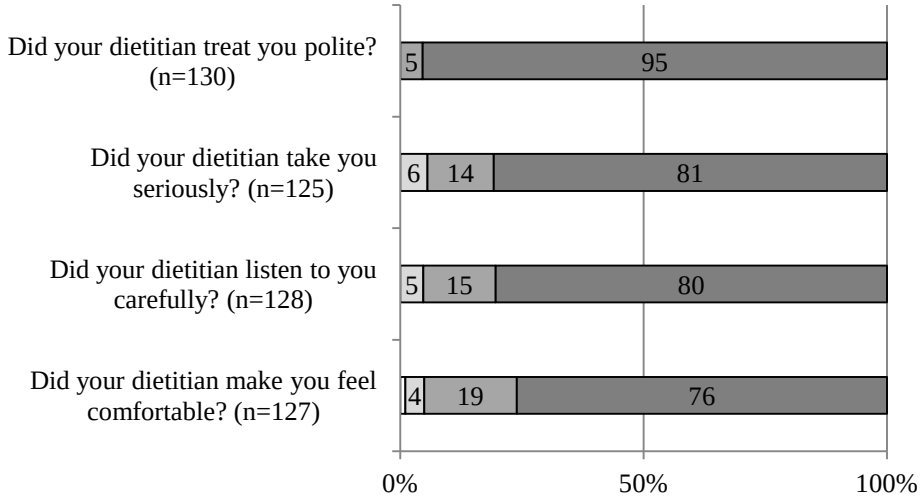


Figure legend: never sometimes often always

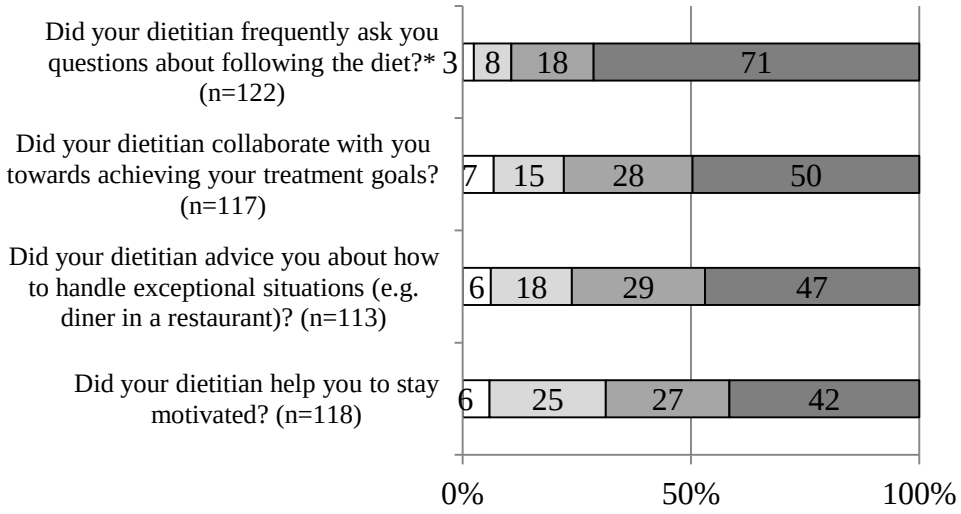
Patients' experiences with dietitians' actions to improve engagement and enablement

Patients' experiences with dietitians' actions to improve engagement and enablement were generally positive. In two out of four items, at least three-quarters of the patients reported to largely or completely agree with the statements. At least three-quarter reported that the dietitian frequently asked them questions about following the diet (89%) and collaborated with the dietitian towards achieving the treatment goals (78%) (Figure 3).

In the other two items, at least one-quarter of patients reported not to agree or only somewhat agree with the statements. At least one-quarter reported

that the dietitian did not sufficiently advise them on how to handle exceptional situations (26%), nor did they sufficiently help them to stay motivated (31%).

Figure 3: Patients experiences with dietitians' actions to improve engagement and enablement



* 4 point scale: never, sometimes, often, always.

Figure legend: no somewhat largely completely

Patients' experiences of health benefits by dietetic treatment

Patients' experiences of health benefits by dietetic treatment varied between respondents. Almost half of the patients reported that they totally disagreed or slightly disagreed on the statements that dietetic treatment has helped them a lot, that it has improved their general health, lifestyle and eating habits. Additionally, 58% of patients reported that dietetic treatment did not sufficiently improve their bodyweight (Figure 4). Most of them were overweight (n=55 with BMI≥25, and n=14 with BMI<25).

Figure 4: Patients' experiences with health benefits by dietetic treatment

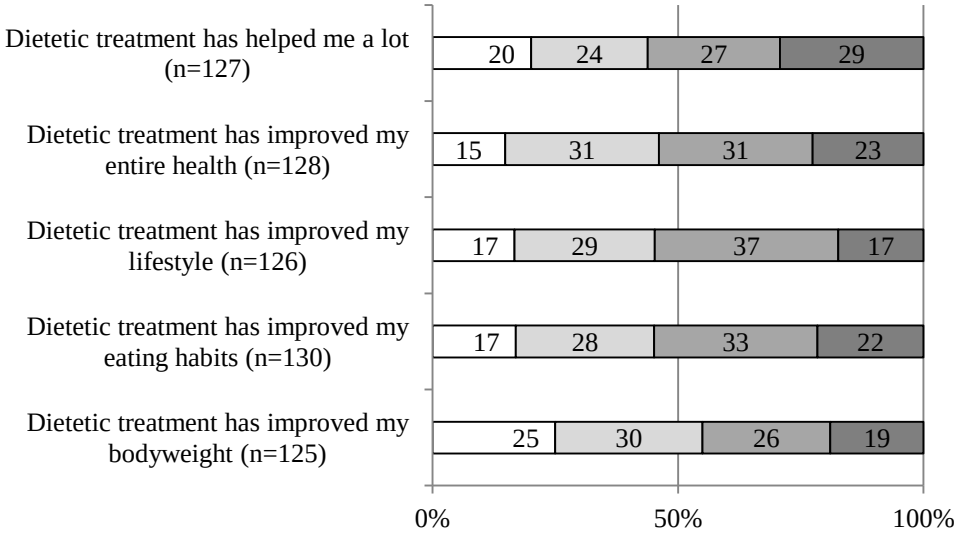


Figure legend: Totally disagree Slightly disagree Largely agree Totally agree

Association between patients' background factors, treatment aspects and patient's experiences with dietitians

Table 1 shows the unadjusted relationship between patients' background factors and treatment aspects on four scales expressing patients' experiences with dietitians. Most of the covariates with $p<0.15$ in bivariate analyses did not reach significant levels in all multivariate linear regression analyses; one covariate remained significant, namely treatment duration. The final four regression models all showed significantly ($p<0.01$) higher experience scores by patients who were treated for longer than 12 months. Patients who were treated longer than six months reported better experiences with dietitians' communication skills and better experiences of perceived health benefits, compared to those treated up to 6 months.

Table 1: Influence of sample characteristics on patients' experiences with dietitians: frequency and bivariate linear regression analyses (n=134)

		Patients' experiences with dietitians, four scales range 1-4			
Characteristic	**Frequency**	**Communication skills (mean±sd= 3.3±0.7)**	**Interpersonal skills (mean±sd= 3.7±0.5)**	**Engagement and enablement (mean±sd= 3.2±0.7)**	**Perceived health benefits (mean±sd= 2.5±0.9)**
	(mean±sd) N(%)	***B***	***B***	***B***	***B***
Mean ± sd age (years)	(56.0±14.2)	<0.01	<0.01	<0.01	**0.01 #**
Gender:					
Male (reference)	58(43.3)				
Female	76(56.7)	-0.09	-0.08	-0.11	-0.11
Educational level :					
Low (primary, lower vocational) (reference)	16(12.3)				
Advanced (secondary, pre university)	85(65.4)	-0.11	-0.06	-0.23	-0.06
High (bachelor's degree or more)	29(22.3)	-0.26	-0.15	-0.28	**-0.41 #**
Marital status:					
Married (reference)	93(69.9)				
Divorced	11(8.3)	-0.07	0.05	<0.01	-0.10
Widowed	11(8.3)	-0.08	-0.22	-0.28	-0.18
Never married	18(13.5)	-0.16	<0.01	-0.20	-0.07
Net. monthly household income:					
Up to €1450 (reference)	13(9.8)				
€1450 < €2100	32(24.2)	**0.32 #**	0.01	0.26	0.44
€2100 <€2900	48(36.4)	0.07	-0.11	0.17	0.34
€2900 +	39(29.6)	0.07	-0.04	0.13	<0.01
Dietetic treatment setting:					
Primary care (reference)	112(86.2)				
Secondary or tertiary care	18(13.9)	-0.10	0.05	<0.01	-0.05
Time of receiving dietetic treatment:					
Currently or < 1 year ago (reference)	35(26.1)				
1+ year ago	99(73.9)	**-0.28 ***	**-0.19 #**	**-0.27 #**	**-0.52** †
Treatment initiative:					
Own initiative (reference)	38(28.4)				
Initiative by others	96(71.6)	-0.07	-0.13	<0.01	0.25
Health problem treated for:					
Overweight without comorbidity (reference)	32(25.4)				
Overweight with comorbidity	69(54.8)	0.08	**0.18 #**	0.05	0.21
Other health problem than overweight	25(19.8)	0.08	0.12	0.15	0.08
Treatment duration :					
0-6 months (reference)	63(56.3)				
7-12 months	20(17.9)	**0.35 ***	0.15	0.25	**0.58 ***
longer than 12 months	29(25.9)	**0.49** ‡	**0.33** †	**0.43** †	**0.74** ‡

Significance level: # p < 0.15; * p < 0.05 ; † p < 0.01; ‡ p < 0.001

Association between patients' expectations , experiences and overall satisfaction

Overall, most people (69.9%) were satisfied with dietetic treatment; 14.3% were completely unsatisfied, 15.8% were somewhat unsatisfied, 42.1% were somewhat satisfied and 27.8% were completely satisfied. Patients' experiences with dietetic treatment most often met their expectations (70.1%), 28.2% had expected more of the dietitian and one patient had less expectations of the dietitian.

Bivariate logistic analyses showed significantly ($p<0.01$) higher odds of satisfaction with dietetic treatment by patients who reported higher experience scores and in patients with met expectations of dietitians compared to those without met expectations of treatment (Table 2).

Table 2: Unadjusted association between patients' experiences and expectations with dietitians on overall satisfaction with dietetic treatment: bivariate logistic regression analyses (n=134)

	Bivariate unadjusted OR (95% CI)	**P-value**
Scale:		
Communication skills	11.44 (4.94;26.45)	<0.001
Interpersonal skills	6.98 (2.79;17.46)	<0.001
Engagement and enablement	5.61 (2.79;11.28)	<0.001
Perceived health benefits	5.35 (2.89;9.88)	<0.001
Expectations:		
Unmet expectations *(reference)*		
Fulfilled expectations	23.6 (8.6;64.9)	<0.001

Discussion

The current study shows that some important aspects of dietetic treatment could use improvement, in particular regarding the effectiveness of dietetic treatment for overweight patients, i.e. the majority was overweight and about half of respondents reported no real health benefits of dietetic treatment. In general, better experiences of health benefits were reported by patients who had been treated longer than six months. These results were in line with the result of an observational study among dietitians in primary healthcare, that showed that reductions in BMI of overweight patients was higher in those treated for longer than 6 months [19]. The causality of this relation however remains unknown. Furthermore, the negative results on perceived health benefits may be due to the relatively large number of respondents who have received dietetic treatment more than a year ago. Possibly, dietary changes were not maintained by this group of respondents and therefore indicate somewhat disappointing long-term effects of dietetic treatment. Therefore, long-term effects of dietetic treatment need to be examined in future studies.
Overall, 70% of patients were satisfied with dietetic treatment. These high levels of reported satisfaction are in line with others showing that patients generally indicate that they are satisfied with care [20]. In general, overall satisfaction with dietetic treatment was higher in patients with better experiences of dietitians and whose expectations were met. Therefore, dietitians should focus on improving patient experiences of dietetic treatment and discuss patients' expectations during treatment. A sizable group of patients expected more of the dietitian. It was not clear to what extent their expectations of treatment were realistic. Several studies have shown that patients typically seek unrealistic weight losses [21, 22]. The disparity between actual and expected weight losses needs to be discussed at the beginning of the treatment [23]. This might help identify unrealistic expectations and, consequently, contribute to satisfaction.

Patients' experiences regarding dietitians' interpersonal skills, communication skills, actions to improve engagement and enablement, were generally positive. The positive experiences regarding dietitians interpersonal skills (e.g. treat patients polite, take them seriously, listen

carefully, and make them feel comfortable) need to be maintained. These positive experiences were comparable to the results in a pilot survey, showing that dietitians rarely miss empathic opportunities [24]. Regarding dietitians' communication skills and provided information, dietitians could more often focus on drawing up the diet plan together. Further items that could be improved are the possibility of contact for questions in between consultations, and providing information about reimbursement of treatment. However, more than 20% of respondents filled out not to remember these items and therefore the results are considered to be less reliable. This information may be of importance to Dutch patient as dietary advice was remunerated by the basic health insurance cover.

Furthermore, dietitians need to improve patient engagement and enablement by advising patients on how to handle exceptional situations and they have to improve their skills to motivate patients. Since the source and nature of one's motivation could shift during treatment, it is very important for dietitians to examine the nature of goals and the quality of motivation behind the desire to change. In order to help patients to stay motivated, dietitians should focus on promoting internal or self-generated motivation for change [25]. Motivational interviewing is a method of strengthening personal intrinsic motivation to behaviour change and has shown to be effective in the areas of diet and exercise [26]. Therefore, there is a need for ongoing education and training for dietitians in the area of motivational interviewing and behavioural change skills.

The current study has three limitations. A first limitation is that the questionnaire has not been validated among patients who visit the dietitian. Therefore, one may argue whether patients who visit the dietitian value the importance of all aspects in this survey. The content of the questionnaire was, however, based on topics that patients treated by allied healthcare professionals consider important [15, 16]. A second limitation of the current study is the potential risk for memory bias, since the majority of respondents received dietetic treatment more than a year ago. Potential memory-bias was reduced in this study by including an extra answer category with "I don't know/ I don't remember". These answers were considered as missing. A

third limitation is the relatively small sample of respondents which made the multivariate logistic regression models unstable. The association between patients' expectations and experiences of satisfaction were therefore only examined by bivariate analysis. A strength of the study is that results were directly collected by patients and not through their dietitians; therefore, there is less risk of socially desirable answers. Another strength of this study is that patients' experiences of dietetic treatment are based on a large sample of dietitians. Demographic and treatment characteristics of the study population were compared with those of the population who visits Dutch primary care dietitians in the Netherlands. Overall, similar patterns were found regarding age, gender, educational level, diagnoses and treatment duration [27]. Therefore, the study sample seems representative for patients who visit primary health care dietitians. Few respondents were treated in hospitals or with other diagnoses that overweight. Therefore, the study sample may be less representative for those patient groups.

Conclusion

In conclusion, patient satisfaction with dietetic services increased by improving patients' expectations and experiences. There is potential for improvement of several aspects of dietetic care, especially regarding the health benefits of dietetic treatment. Several recommendations can be offered for dietitians to improve aspects of care: draw up the diet plan together with the patient, discuss expectations of treatment, advise patients on how to handle exceptional situations and improve motivation skills. The effectiveness of these aspects of dietetic care has yet to be established in future studies.

Competing interest

This work was supported by the Dutch Ministry of Health, Welfare and Sport. There are no conflicts of interest.

Authors' contributions

All authors were involved in the conception and design of the study and in the acquisition and interpretation of data. JT performed the statistical

analyses and drafted the paper. All authors have critically reviewed the manuscript and have given final approval of the version to be published.

Acknowledgments
The authors would like to thank Anne Brabers and Margreet Reitsma-van Rooijen for critically reviewing the questionnaire and the respondents for their effort and time to fill in the questionnaire.

References

1. The Dutch Dietetic Association. Artsenwijzer diëtetiek, hoofdstuk werkwijze diëtist [Doctor's reference guide to dietetics, chapter dietitian working methods]. Houten: NVD; 2013 [cited July 1, 2013]. Available from: http://www.artsenwijzer.info/site/?page=7&lg=en
2. Jackson JA, Kinn S, Dalgarno P. Patient-centred outcomes in dietary research. JHumNutrDiet. 2005;18(2):83-92.
3. Delnoij DM. Measuring patient experiences in Europe: what can we learn from the experiences in the USA and England? EurJ Public Health. 2009;19(4):354-6.
4. Sixma HJ, Kerssens JJ, Campen CV, Peters L. Quality of care from the patients' perspective: from theoretical concept to a new measuring instrument. Health Expect. 1998;1(2):82-95.
5. Delamater AM. Improving Patient Adherence. Clinical diabetes. 2006;24(2):71-7.
6. Mitchell AJ, Selmes T. Why don't patients attend their appointments? Maintaining engagement with psychiatric services. Advances in Psychiatric Treatment. 2007;13:423-34.
7. Crustolo AM, Ackerman S, Kates N, Schamehorn S. Integrating nutrition services into primary care: Experience in Hamilton, Ont. Can Fam Physician. 2005;51:1647-53.
8. Cant RP, Aroni RA. Exploring dietitians' verbal and nonverbal communication skills for effective dietitian-patient communication. J HumNutrDiet. 2008;21(5):502-11.
9. Hancock RE, Bonner G, Hollingdale R, Madden AM. 'If you listen to me properly, I feel good': a qualitative examination of patient experiences of dietetic consultations. JHumNutrDiet. 2012;25(3):275-84.
10. Kerssens JJ, van Yperen EM. Patient's evaluation of dietetic care: testing a cognitive-attitude approach. Patient Educ Couns. 1996;27(3):217-26.
11. Ludt S, van LJ, Campbell SM, Rochon J, Ose D, Freund T, et al. Identifying factors associated with experiences of coronary heart disease patients receiving structured chronic care and counselling in European primary care. BMC Health ServRes. 2012;12(1):221.

12. Brabers AEM, Reitsma-van Rooijen M, de Jong JD. Consumentenpanel Gezondheidszorg: basisrapport met informatie over het panel [The Dutch Health Care Consumer Panel: basic report with information about the panel]. Utrecht: NIVEL; 2012.
13. The Dutch Health Care Consumer Panel. About the panel. Utrecht: NIVEL; 2013 [cited 2013]. Available from: http://www.nivel.nl/dossier/about-panel .
14. Tol J, Swinkels IC, De Bakker DH, Veenhof C, Seidell JC. Overweight and obese adults have low intentions of seeking weight-related care: a cross-sectional survey. BMC Public Health. 2014;14:582.
15. de Boer D, Veenhof C, Delnoij D. CQ-index Fysiotherapie, versie 2.3: psychometrische eigenschappen en discriminerend vermogen [Consumer quality index physical therapy, version 2.3: psychometric quality and distinctive ability]. Utrecht: NIVEL; 2009.
16. Vivanti A, Ash S, Hulcombe J. Validation of a satisfaction survey for rural and urban outpatient dietetic services. JHumNutrDiet. 2007;20(1):41-9.
17. CVZ. Instructions calculating consumer quality index scale scores (in Dutch: Werkinstructie Berekening CQI-schaalscores, code WIS 07.01). Diemen: CVZ; 2013 [cited 2013].
    Available from: http://www.cvz.nl/kwaliteit/toetsingskader+en+register/cq-index/handboek+cqi-metingen .
18. Bursac Z, Gauss CH, Williams DK, Hosmer DW. Purposeful selection of variables in logistic regression. SourceCodeBiolMed. 2008;3:17.
19. Tol J, Swinkels ICS, de Bakker DH, Seidell JC, Veenhof C. Dietetic treatment lowers body mass index in overweight patients: an observational study in primary health care. J Hum Nutr Diet. 2013.
20. Jenkinson C, Coulter A, Bruster S, Richards N, Chandola T. Patients' experiences and satisfaction with health care: results of a questionnaire study of specific aspects of care. Qual Saf Health Care. 2002;11(4):335-9.
21. Foster GD, Wadden TA, Phelan S, Sarwer DB, Sanderson RS. Obese patients' perceptions of treatment outcomes and the factors that influence them. ArchInternMed. 2001;161(17):2133-9.
22. Foster GD, Wadden TA, Vogt RA, Brewer G. What is a reasonable weight loss? Patients' expectations and evaluations of obesity treatment outcomes. J Consult ClinPsychol. 1997;65(1):79-85.

23. Foster GD, Makris AP, Bailer BA. Behavioral treatment of obesity. AmJ ClinNutr. 2005;82(1 Suppl):230S-5S.
24. Goodchild CE, Skinner TC, Parkin T. The value of empathy in dietetic consultations. A pilot study to investigate its effect on satisfaction, autonomy and agreement. JHumNutrDiet. 2005;18(3):181-5.
25. Teixeira PJ, Silva MN, Mata J, Palmeira AL, Markland D. Motivation, self-determination, and long-term weight control. Int J Behav NutrPhysAct. 2012;9:22.
26. Martins RK, McNeil DW. Review of Motivational Interviewing in promoting health behaviors. ClinPsycholRev. 2009;29(4):283-93.
27. Tol J, Swinkels ICS, de Bakker DH, Veenhof C. Jaarcijfers en Trendcijfers 2008-2010 dietetiek, gegevensverzameling binnen vrijgevestigde praktijken voor diëtetiek [Annual Statistics and Trends 2008-2010 Dietetics, Data Collection on Dietitians Working in Private Practices in Primary Health Care]. Utrecht: NIVEL; 2012.

Appendix 1: Content of the questionnaire

Questions about your background

1. What is your date of birth?

(day – month – year)

2. Are you a men or a women?

- ❑ Men
- ❑ Women

3. Have you ever received dietary treatment from a healthcare provider (such as a general practitioner or dietitian), or are you currently undergoing dietary treatment?

- ❑ No (end of questionnaire)
- ❑ Yes
- ❑ I don't remember

General information about dietetic treatment

4. From which healthcare provider do or did you receive dietary treatment?

- ❑ Dietitian
- ❑ Other caregiver (end of questionnaire)

5. How long ago did you finish your most recent dietetic treatment?

- ❑ I'm currently undergoing dietetic treatment
- ❑ Less than 1 year
- ❑ 1 year or longer

6. In what setting did the dietitian work?

- ❑ Primary care (e.g. private practice, health center, home care)
- ❑ Secondary or tertiary care (e.g. hospital, nursing home, mental health care
- ❑ I don't remember

7. Who initiated dietetic treatment?

- ❑ I did
- ❑ Initiative by others (e.g. relatives, friends or family, general practitioner)
- ❑ I don't remember

8. For what complaints, diseases or conditions did you receive dietetic treatment?

- ❑ No disease, I came for general nutritional advice
- ❑ Diabetes type I
- ❑ Diabetes type II
- ❑ Eating disorder
- ❑ Cardiovascular disease
- ❑ High blood pressure
- ❑ High lipid levels
- ❑ High blood sugar levels
- ❑ Chewing and/or swallowing problems
- ❑ Cancer
- ❑ Lung disease
- ❑ Digestive disorders
- ❑ Undernutrition
- ❑ Overweight
- ❑ Metabolism disorders
- ❑ Food allergy and/or food intolerance
- ❑ Other complaints, diseases or conditions, namely…

9. What is your current height?

__ __ __ centimetres

10. What is your current weight? If you are pregnant, please report your pre-pregnancy weight.

__ __ __ kilograms

11. What was the duration of treatment?

- ❑ 0-6 months
- ❑ 7-12 months
- ❑ Longer than 12 months
- ❑ I don't remember

Communication and information

12. Did your dietitian give you information about reimbursement of dietetic treatment? *

- ❑ No
- ❑ Somewhat
- ❑ Largely
- ❑ Completely
- ❑ I don't remember

13. Did your dietitian try to understand the problem you came for?

- ❑ No
- ❑ Somewhat
- ❑ Largely
- ❑ Completely
- ❑ I don't remember

14. Did your dietitian give you information about the expected progress of your disease, condition or complaint? *

- ❑ No
- ❑ Somewhat
- ❑ Largely
- ❑ Completely
- ❑ I don't remember
- ❑ Not applicable

15. Did your dietitian draw up the diet plan together with you?

- ❑ No
- ❑ Somewhat
- ❑ Largely
- ❑ Completely
- ❑ I don't remember

16. Did your dietitian clearly explain about how to vary the diet?

- ❑ No
- ❑ Somewhat
- ❑ Largely
- ❑ Completely
- ❑ I don't remember

17. Did your dietitian give you advice for daily living?

- ❑ Never
- ❑ Sometimes
- ❑ Often
- ❑ Always
- ❑ I don't remember

18. Were you able to contact your dietitian for questions (by telephone of email) in between consultations? *

- ❑ Never
- ❑ Sometimes
- ❑ Often
- ❑ Always
- ❑ I don't remember
- ❑ Not applicable

19. Did your dietitian explain things in an understandable manner?

- ❑ Never
- ❑ Sometimes
- ❑ Often
- ❑ Always
- ❑ I don't remember

Interpersonal skills

	Never	*Sometimes*	*Often*	*Always*	*I don't remember*
20. Did your dietitian treat you polite? **	❑	❑	❑	❑	❑
21. Did your dietitian listen to you carefully?	❑	❑	❑	❑	❑
22. Did your dietitian take you seriously?	❑	❑	❑	❑	❑
23. Did your dietitian make you feel comfortable?	❑	❑	❑	❑	❑

Engagement and enablement

24. Did your dietitian frequently ask you questions about following the diet?

- ❑ Never
- ❑ Sometimes
- ❑ Often
- ❑ Always
- ❑ I don't remember
- ❑ Not applicable

25. To what extent did your dietitian advice you about how to handle exceptional situations (e.g. diner in a restaurant)?

- ❑ No
- ❑ Somewhat
- ❑ Largely
- ❑ Completely
- ❑ I don't remember
- ❑ Not applicable

26. Did your dietitian collaborate with you towards achieving your treatment goals?

- ❑ No
- ❑ Somewhat
- ❑ Largely
- ❑ Completely
- ❑ I don't remember
- ❑ Not applicable

27. Did your dietitian help you to stay motivated?

- ❑ No
- ❑ Somewhat
- ❑ Largely
- ❑ Completely
- ❑ I don't remember
- ❑ Not applicable

Health benefits

28. Dietetic treatment has…	*Totally disagree*	*Somewhat agree*	*Largely agree*	*Totally agree*	*Not applicable*
improved my general health	❑	❑	❑	❑	❑
improved my lifestyle ***	❑	❑	❑	❑	❑
improved my eating habits	❑	❑	❑	❑	❑
improved my bodyweight	❑	❑	❑	❑	❑
helped me a lot	❑	❑	❑	❑	❑

Overall satisfaction

29. How satisfied are you with your dietetic treatment?

- ❑ Totally dissatisfied
- ❑ Somewhat satisfied
- ❑ Largely satisfied
- ❑ Totally satisfied
- ❑ I don't remember

30. To what extent do your experiences with the dietitian match your expectations?

- ❑ I expected more of the dietitian
- ❑ I expected less of the dietitian
- ❑ Generally speaking they matched well
- ❑ I don't remember

31. What grade would you give your dietitian? Possible values range from 0 (very bad) to 10 (excellent dietitian).

—

32. Would you recommend this dietitian to friends and family?

- ❑ Definitely not
- ❑ Probably not
- ❑ Yes, probably
- ❑ Yes, definitely
- ❑ I don't know

** Excluded from the scale; ≥ 20% missing*
*** Excluded from the scale; 90% of the frequency in one category*
**** Excluded from the scale; highly correlated (r>0.85) with item 28c*

9

Discussion

Discussion

Worldwide there is a high prevalence of Noncommunicable diseases (NCDs) [1]. Considering the fact that overweight and obesity have a negative effect on major risk factors for NCDs [2] prevention and weight management of overweight and obesity is important to reduce these risk factors. A few kilos of weight loss can contribute to meaningful improvements in health-related risk factors [3, 4]. However, because of the complexity of this multi-factorial problem, many persons find it difficult to lose weight and maintain weight-loss. Obesity prevention and management is recommended for overweight and obese persons. This may include individual advice on a healthy lifestyle or individual tailored weight management programs, focusing on nutrition, physical activity and behavioral aspects [5]. Dietary treatment is therefore an important aspect of the prevention and treatment of obesity.

A primary care provider who regularly encounters weight-loss problems is the dietitian. Transparency on the effects of dietetic health services use is important for patients, as well as to others. For example, it can contribute to patient-decision making to visit a dietitian, referral behavior of health care professionals, or reimbursement policy of insurers for dietetic health care. This thesis increases transparency on several factors associated with health care utilization of dietetic services in primary health care. In the first section of this last chapter we will reflect on the conceptual model presented in the introduction in relation to our principal findings. Hereby, we will first point out different factors associated with dietetic health care utilization described from a perspective of potential patients, by focusing on characteristics of persons who were ready to lose weight and intended to use self-care or weight-related care. Then, the role of the referrer in dietetic health care utilization and the influence of reimbursement on dietetic health services use are discussed. Last, characteristics of patients' treatment at the dietitian are described, for example by focusing on factors associated with the intensity of dietetic health services use and outcome of dietetic care. In the next paragraphs of this chapter we will reflect on the methodological considerations, the relevance and implications of the findings for research, practice and policy, and the main conclusions.

Reflection on the principal findings

In the introduction of this thesis we presented Andersen's health behavioural model that suggested that people's use of health services (health behavior) may be increased or decreased through environmental aspects, population characteristics, and outcome [6]. Research questions were based on the different elements of this model in order to understand and explain dietetic health services use, by focusing on an overweight population. The principal findings are summarized into a conceptual framework on factors that influence dietetic health services use (see Figure 1). In this paragraph, we reflect on this model in relation to our principal findings. Results from the current thesis showed many associations between health behavior and the other three domains, i.e. population characteristics, environment and outcomes, which are discussed in the next paragraphs.

Population characteristics and health behavior

Several associations between population characteristics and health behavior were observed in this thesis. For example, chapter 5 showed that, depending on the level of weight related health risk (WRHR), individuals with a higher educational level, those who were not married, those with better perceptions and expectations of dietitians, and those with an accurate perception of weight, had generally higher odds for readiness to lose weight. In general, many overweight people were not ready to lose weight. Obesity prevention initiatives should therefore focus on increasing the awareness of the seriousness of this condition and offer individually tailored weight management programs [5].

Further results showed that need was associated with the intention to use weight-related care. For example, having the intention to use weight-related care was significantly higher for those with a moderately, severely, or very severely elevated level of WRHR compared to those with a mild WRHR. In addition, those who perceived their general health as poor more often intended to use weight-related care. Other population characteristics, such as enabling resources were not significantly associated with the intention to use weight-related care (chapter 5). We believe that this non-significant association was observed due to limited power of the tests with regard to this

research question, as results from chapter 4 showed that many persons living in low socioeconomic areas no longer visited a dietitian in case they had to pay for dietetic treatment themselves. Additionally, patients with other conditions than diabetes or copd (such as cardiovascular risk factors, malnutrition, irritable bowel syndrome or food sensitivity) did no longer consulted a dietitian. Therefore, results indicate that restriction of reimbursement can result in inequitable access, fewer prevention efforts for cardiovascular disease and fewer treatments for malnutrition or disorders of the gastrointestinal tract. Schoen et al. highlight the importance of health care reimbursement to enable more equitable access to primary and preventative care. They showed that when insured, middle- and lower-income adults across American states were far more likely to have primary care access or receive preventive care [7]. Given the high prevalence of overweight and obese persons in the Netherlands, it is important that people are not hindered to use professional dietary advice for weight loss. Reimbursement for dietary advice is one of the opportunities that the Dutch government can offer to limit the threshold to the dietitian's office.

For those who decided to visit a dietitian, it was shown that several predisposing characteristics were associated with the volume of health services use (chapter 6). Significantly more dietetic healthcare was used by older patients, females, the native Dutch, patients with a history of dietetic healthcare, patients with multiple diagnoses, overweight, or patients with binge eating disorder. The association between demographics, nutrition related conditions (need) and the uptake of dietetic services was confirmed by an observational study using data from a Hospital Information System in the United Kingdom. They showed that many patients with diabetes did not make use of professional dietetic services. Those who did visit the dietitian were more likely to: be older, male, accessing hospital diabetes services, have lipids and renal function checked, and have poor blood glucose control [8]. The observed associations for gender and uptake of dietetic services vary, which may be explained by the different health care sectors, i.e. primary care compared to hospital services.

Environment and health behavior

Several associations between environment and health behavior were observed in this thesis. Examples of environmental factors include the healthcare system and practice characteristics. Health behavior was expressed as the use of dietetic health services. Therefore, an additional line was included in the model on dietetic health services use, showing that the environment is associated with health behavior.

For example, results from chapter 6 showed that in Dutch dietetic practices, the majority of patients were referred by general practitioners. After dietitians became directly accessible without a referral from a physician, most patients continue to visit their dietitian by referral [9]. Therefore, general practitioners were shown to be important actors in patients' decision making process to visit the dietitian. A controlled trial of providing dietetic advice in primary health care diabetes clinics in the North of England also showed an association between the use of dietetic services and environmental aspects, i.e. results showed that placing a dietitian in diabetes clinics improved the uptake of dietetic advice [10]. However, referring patients for dietetic treatment does not necessarily mean that these patients are motivated enough for successful behavioral change. For example, results showed that patients who were referred to a dietitian used fewer consultations at the dietitian compared to those who started dietetic treatment on their own initiative (chapter 6). Results from an observational study in the Netherlands showed that the group of patients who visited the dietitian based on their own initiative, generally had better treatment results than the group of patients referred by a general practitioner [11]. Possibly, the non-referred patients had higher motivation. Dietitians may take this into account, for example by focusing on techniques to help referred patients to increase their internal motivation to change.

Other results showed that reimbursement policy for dietary advice had a strong influence on the uptake of dietetic services (chapter 4). Many patients did no longer consulted a dietitian after reimbursement for dietary advice was limited. Additionally, results showed that a year after the limited reimbursement for dietary advice, the majority of practices were not fully recovered from the decline in visiting patients. What can be learned from

this experience, is that cancelation of applied policy changes in reimbursement for dietary advice does not automatically result in a recovery of the old situation. Therefore, it is important that sudden and temporary policy changes in reimbursement for dietary advice will be prevented in the future. Furthermore, results showed many differences between practices in recovery rate of their patient population (chapter 4). Practice characteristics explained a substantial part of these differences, which indicates that practice characteristics have a strong influence on the uptake of dietetic services as well.

Medical practice variation was also observed in chapter 6. Results showed that considerable variation in patient's number of consultations per treatment was due to dietitians. Patient's characteristics only partly explained the variation between dietitians in the number of consultations they provided per treatment, which indicates that similar patients receive different dietetic treatments. The observed medical practice variation is not uncommon in health services research [12]. However, in order to prevent under and over treatment, future research is necessary to examine how many consultations per treatment are beneficial for patients' treatment. Consequently, guidelines can include more specific evidence based recommendations on the number of consultations that are proven to be effective.

Health behavior and outcome of dietetic care

For people who underwent dietetic treatment, it was shown that health behavior, such as the volume of health services use was associated with outcomes of care, i.e. perceived health status and evaluated health status. For example, patients with better perceptions on the health benefits of dietetic treatment were more often treated longer than six months (chapter 8). Additionally, patients' change in body mass index (BMI) during dietetic treatment was evaluated in chapter 7 and greater BMI reductions were observed in those treated for at least 6 months. A positive association between the volume of dietetic health services use and outcomes was also reported by others [13, 14]. However, the cause and effect of this association has not been previously investigated. Furthermore, it is important that treatment is maintained for a longer period of time. In daily dietetic practice, the majority of patients end treatment within six months (chapter 7), while

obesity guidelines recommend that patients should be treated for at least one year, followed by continuous or long-term guidance for weight loss maintenance [5]. High dropout rates are frequently reported in clinics for weight management [15, 16], which may also vary between clinics [17]. This high dropout rate may be one of the reasons that the average patient population at the dietitian did not achieve clinically relevant weight losses of 5 – 10%, i.e. patients' BMI significantly decreased by 0.94 kg/m² (or -3% weight loss) on average during treatment (chapter 7). However, modest weight loss results may still contribute to the improvement of cardiovascular risk factors [18]. Future studies examining the effectiveness of dietetic treatment should focus on factors contributing to drop-out in order to identify high risk patients groups and in turn develop more targeted intervention programs with the aim to improve treatment retention.

Outcome, environment, population characteristics

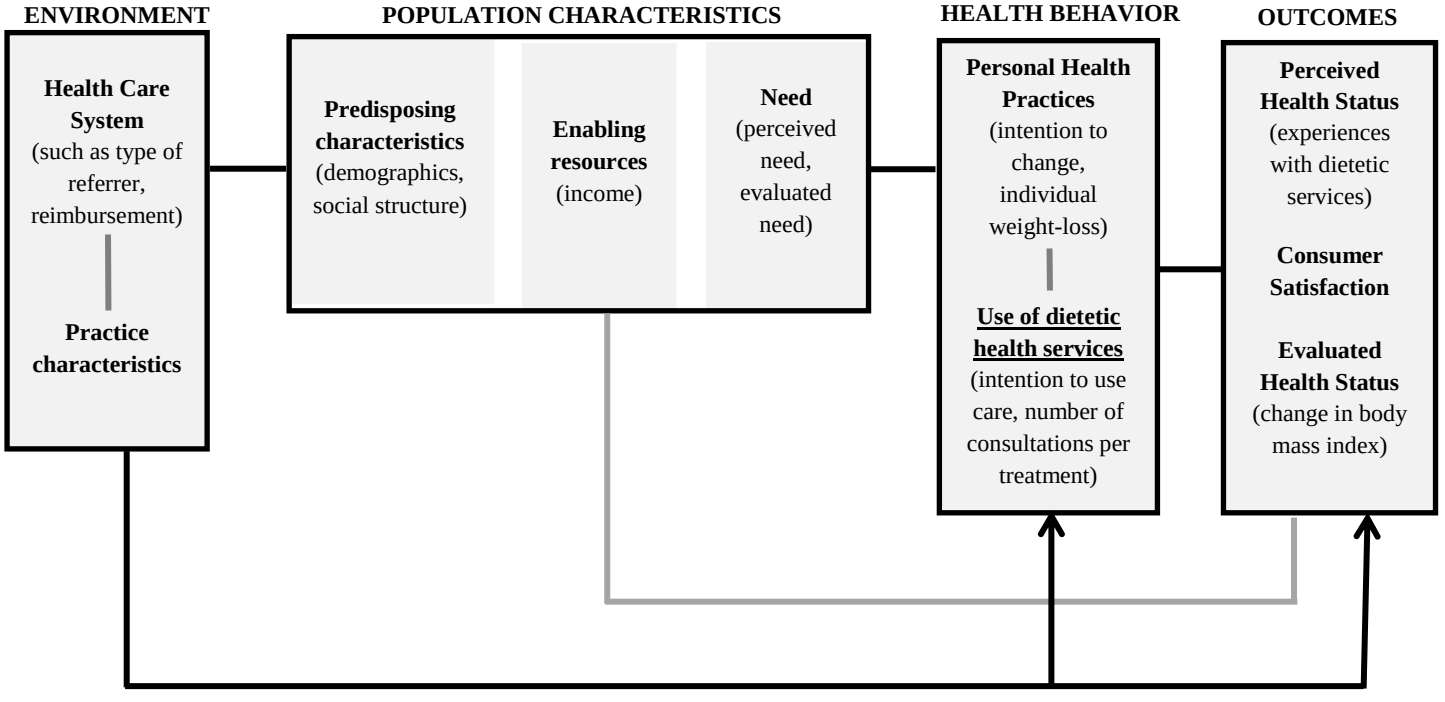
The thesis also observed associations between outcome, environment and population characteristics. The outcome and the environment were associated due to variation in the patients' mean BMI change between dietitians. Results showed that the average BMI change ranged from -1.41 to -0.62 kg/m² between dietitians, or an average weight loss of 2% to 4.5%. These results indicate that some practices perform better than others, which demands further investigation.

Further associations between environmental aspects and the outcome of care were not examined in this thesis. However, it is known that currently more and more people struggle against environments which increasingly promote a high energy intake and a sedentary behavior; aspects that do not contribute towards positive weight loss outcomes [19]. The government can help promote supportive environments for making healthy food choices and encourage physical activity. For example, by supporting programs focusing on sport and exercise in the neighborhood, by working together with the food industry to reduce salt and saturated fat levels in foods, or by stimulating consumption of breakfasts at schools and healthy food at canteens.

The environment was also associated with population characteristics, for example results showed that general practitioners hold different referral policies for obese patients. Lower referral percentages were more often reported by overweight or obese general practitioners, those who did not have frequent contact with a dietitian, and those who did not believe that educating obese patients about weight-related comorbidities was part of their care (chapter 3). Current guidelines for general practitioners weight management policy are outlined in the Obesity Standard of the Dutch College of General Practitioners (NHG) and allow room for general practitioners to execute their own weight management policy. In the context of preventive medicine, this deserves more attention.

Other results showed that population characteristics were associated with outcomes (perceived health status, evaluated health status and consumer satisfaction). For example, overall satisfaction with dietetic treatment was higher in patients whose expectations were met (chapter 8). Therefore, dietitians should continue focusing on discussing patients' expectations during treatment. Furthermore, it was shown that overweight patients with cardiovascular risk factors or other co-morbidities had smaller reductions in BMI compared to patients with overweight alone. It may be possible that these patients use medication that negatively influences weight loss [5]. Better weight loss results demands timely start of dietetic treatment.

Figure 1: Associations between environmental aspects, population characteristics, health behavior and outcome of dietetic health services use; principal findings of this thesis



Strengths and limitations

The research questions of this thesis were answered using different methods for data collection; all studies were observational, three longitudinal studies used data from electronic health record of dietetic practices and four cross-sectional studies used data from surveys, which all have it strengths and limitations. The main strengths and limitations are considered below.

Strengths

A major strength of this thesis is that dietetic health services use was examined from multiple perspectives, using data from surveys amongst general practitioners, dietitians, the Dutch population and patients (chapter 2, 3, 5 and 8). Additionally, three out of seven studies (chapter 4, 6 and 7) included in this thesis were based on data collection from electronic health records (EHR) of dietetic practices in primary health care in the Netherlands. Therefore we were able to create a conceptual framework on different aspects that may influence dietetic health services use, which provide insight for research, practice and policy. To our knowledge a framework for dietetic health services use has not been previously examined.

Using data on patients' electronic health records can be very suitable form health services research since many aspects of patients' treatment (e.g. patients' demographics, health problems, number of consultations, body mass index) are standard registered within these EHRs. Therefore data can be collected on different levels, i.e. consultations, treatment episodes of care, patients, dietitians and practices. A strength of using these type of data is the large sample of patients. Additionally, since data were collected based on the dietitians' usual registration in electronic health records there is no risk for recall bias.

Limitations

Like every observational study there are some limitations regarding the representativeness of the participants. The chapters using data from electronic health records were based on a convenience sample of practices, which may have resulted in inclusion of more active practices. Additionally, data collection was restricted to dietitians working with a specific software

package frequently used by dietitians working in private practices. The results are therefore not representative to dietitians working in home care institutions in primary care, but only represent dietitians working in a private practice in primary care.

Furthermore, for many of the results it was not possible to determine the direction of the observed effects, as they were based on studies with a cross-sectional design. In one study, time-series data were used to determine the influence of changes in reimbursement on patients' visits at the dietitian. In this longitudinal study it was possible to establish a causal relationship, although other factors might have influenced the relationship as well.

Another limitation of the studies included in this thesis is the quality of data registration. In the studies using routinely collected data, the quality of the data relies on dietitians to accurately record all relevant data in their software program. Therefore, standardized quality control checks were applied. The quality of data registration in the surveys relies on self-reported data, which may have resulted in response bias or memory bias.

Aside from the methodological limitations, it is important to discuss some theoretical limitations. Andersen's health behavioural model was used in this thesis to help understand dietetic health services use. The model was developed to understand why people use health services and to define and measure equitable access to health care [6]. However, we have also used this model to help in understanding which factors are associated with the volume of dietetic health services use. This may explain some of the differences in observed results between chapter 4 and 6. For example, a lower socioeconomic status score was associated with making less use of dietetic services (chapter 4), but among those who had contact with the dietitian, lower educational level was associated with a higher intensity of use (chapter 6). Similar differences in the direction of the observed effects on health services use and volume of use were reported by Asada et al. [20]. Since, the direction of the observed associations between health services use and volume of use may vary, arrows expressing a suggested direction were not included in Figure 1. Furthermore, Andersen's model includes an association between external environmental factors and population characteristics, and

between external environmental factors and outcomes of healthcare. Since external environmental factors were not examined in this theses we were not able to include these as contributing factors in Figure 1.

Relevance and implications

The results in this thesis offer some agenda points for patients, health care professionals, health care insurers, policy makers, and researchers which are listed below.

Patients

Regular self-monitoring of body weight

Nearly half of the Dutch population is medically in need of weight-related care. However, only half of them have an accurate perception of their weight. Those who did have an accurate perception were more often ready to lose weight (chapter 5). For prevention of weight-related conditions, it is important that persons become aware of their weight and create accurate perceptions. Regular self-monitoring of body weight (self-weighing) has shown to be associated with lower body mass index [21-23] and can therefore be valuable to individuals trying to lose weight or prevent weight gain. Self-monitoring is therefore an important aspect of successful weight loss maintenance [21].

Start weight-related care in time

Many overweight persons who are planning to lose weight, want to do so individually (chapter 5). However, it is shown that individual weight-loss attempts can be less effective compared to attempts with weight-related care by a dietitian [24-27]. For overweight people without co-morbidities, obesity guidelines recommend that people try to lose weight by following general advice on a healthy lifestyle and a healthy diet [5]. In cases where weight-loss does not succeed, it is important to start weight-related care. Especially since people with failed weight-loss attempts can become demoralized about their ability to lose weight, and consequently quit trying to lose weight (chapter 5).

Health care professionals

General practitioners should consider providing more conversations about a healthy weight

Although Dutch general practitioners believed that promoting a healthy weight is an important part of GP care, they were less likely to discuss weight with overweight patients with a mildly increased WRHR compared to those with elevated levels of WRHR (chapter 3). Similar results were reported by Smith et al. [28]. Therefore, general practitioners can play a larger role in the prevention of their patients becoming overweight and obese. For example, increasing discussions about the importance of weight for good health and creating awareness about weight gain at an early stage is an important step for behavioral change. This might help overweight and obese patients who are not ready to lose weight to become more willing to engage in weight-behavior change and receive weight-related care [29].

General practitioners should keep focusing on patients' motivation for dietary treatment

General practitioners played an important part in patients' decision making process to visit the dietitian. However, results showed different referral policies by general practitioners for obese patients to other health care providers for nutrition and/or dietary advice, such as consulting a dietitian (chapter 3). Lack of patients motivation was reported as the most important barrier for referral to a dietitian, which has also been reported in other studies [30]. Motivational interviewing is a method of strengthening personal intrinsic motivation for positive behavior change and has shown to be effective in the areas of diet and exercise [31]. It can be seen as a key tool for primary care consultations for obesity management [32]. Therefore, motivational interviewing should more often be used in general practice [33]. Additionally, a clearer and more structured referral policy for general practitioners referring patients for dietary advice may stimulate health behavior. An example of this would be using the Dutch nutrition care module [34]. This module would be beneficial as a framework for referring patients to a dietitian because it provides insight into the different types of nutritional care and the requirements for the delivery of adequate nutritional care by caregivers with the right competences.

Dietitians should keep focusing on patients expectations and applying motivational skills

Dietitians should keep focusing on discussing patients expectations of their treatment as met expectations were positively associated with overall satisfaction with dietetic treatment (chapter 8). Additional results also showed that a sizable group of patients reported that their dietitian did not help them to stay motivated (chapter 8). This indicates the importance for dietitians to keep focusing on promoting internal or self-generated motivation for change. For example, by applying motivational interviewing techniques [35].

Dietitians should keep focusing on improving entrepreneurial skills

Dietitians could also focus on continuously improving their entrepreneurial skills. These skills have become more important given the increased competitive elements in the Dutch health care system. For example, since the introduction of bundled payments dietitians need to obtain a contract from a care group in order to provide dietary advice for patients with diabetes. Further developing negotiation skills to obtain a proper contract from a care group can therefore become more important for dietitians. Especially since results showed that generally more patients visited dietetic practices if the dietetic practice had good collaboration with the general practitioner, or if they participated in a care group (chapter 4).

Offer effective dietary treatments

Patients with a medical indication who require dietary treatment should be offered effective care. This thesis showed modest effects of dietetic treatment in overweight patients on evaluated health status and perceived health status and better effects for patients who were treated for longer than six months (chapter 7 and 8). The long-term effects of treatment by a dietitian remains unclear. Dansinger et al showed in a meta-analysis that the effect of dietary counseling programs resulted in a weight loss of approximately 5 kg in 1 year (6% of initial body weight). After three years approximately half of the initial weight loss was typically regained [13]. Therefore, extended care may be necessary for long-term health benefits [36]. Dietitians should be encouraged to follow guidelines for obesity

treatment, which recommend a combined lifestyle intervention [5] i.e. a combination of physical activity, behavior therapy and diet.

Health care insurers

Provide reimbursement for combined lifestyle interventions

For successful management of obesity it is recommended to offer combined lifestyle interventions, as they provide the best weight loss results [37]. These interventions should be offered in multidisciplinary teams, where the care delivery is organized in a way that is patient-centered, such as care delivery in care groups. Today, the organization of Dutch obesity care groups is still in its initial phase due to insufficient reimbursement for the care delivery of these programs. As prevention of obesity and its comorbidities is of high importance, health care insurers should reconsider their reimbursement policy for combined lifestyle interventions.

Consider reducing the own-risk element for dietary advice

Results from chapter 4 showed that many individuals are not able or willing to pay for dietetic treatment. At the current moment, dietary advice is reimbursed for up to 3 hours a year by the basic health insurance cover. However, in 2015, everyone had to pay the first 375 euro of the health costs; also known as own risk. The own-risk has increased over the last years and may be a barrier for dietetic health services use by the vulnerable patient population (chapter 4). Health care insurers are allowed to (partially or completely) reduce the cost of the own-risk element of health care (See Article 21 of the Dutch health insurance act). An incentive to activate this guidance tool (called sturingsinstrument in Dutch) can be prevention of unnecessary health care costs in the future or improvements of general health [38]. Healthcare insurers may consider reducing the own-risk element for dietary advice.

Policy makers

Avoid sudden and temporary changes in reimbursement for dietary advice

In the Netherlands, dietary advice was prioritized by health policy makers in the prevention nota 2007 – 2010 [39]. The next prevention nota produced by the Dutch Ministry of Health, Welfare and Sport emphasizes the importance on self-decision making in lifestyle behaviors. Along with this, the minister

believed that people were able to pay for the costs of dietetic treatment themselves [40] and cut down expenses on lifestyle policy were announced [41]. Consequently, in 2012 the Dutch minister of health limited reimbursement for dietary advice to patients with several chronic conditions treated within multidisciplinary coordinated care groups. However, there was no nationwide implementation of care groups for COPD and vascular risk management [40]. This resulted in a substantial decline of dietetic uptake, inequitable access, fewer treatments for patients with nutrition related conditions other than diabetes or COPD, and a reduction in the dietitian workforce (chapter 4). What can be learned from this is that many patients cannot pay or are unwilling to pay for dietetic treatment, although dietary advice is an important aspect of many chronic diseases [42]. Therefore, reimbursement for dietary advice should not be restricted to specific medical indications or restricted to multidisciplinary coordinated care groups in case they are not adequately implemented in the regular health care system. Further results showed that a year after the limited reimbursement for dietary advice, the majority of practices did not fully recover from the decline in visiting patients. Therefore, cancelation of applied policy changes in reimbursement for dietary advice does not automatically result in a recovery of the old situation. For these reasons it is important that sudden and temporary policy changes in reimbursement for dietary advice should be prevented from occurring in the future. A consistent reimbursement policy for dietary advice can therefore be recommended.

Researchers

Further investigation of factors that may influence health behavior

Future studies should focus on trying to understand the different kind of factors that may influence the peoples' decisions to use dietetic health care. This may contribute to changing the high prevalence of nutrition related diseases. Although many associations between health behavior and the environment, and population characteristics and outcome were examined in this study, some of the results need to be confirmed by further studies, as the associations are based on a relatively small sample or, based on self-reported data.

Examine the factors associated with dropout

Research should also focus on trying to understand the different kind of aspects that may influence premature dropout in daily dietetic practice, as this negatively influences the positive effect of treatment (chapter 7). A systematic review examined 61 studies addressing factors associated with weight loss program attrition. The authors claim that dropouts may be attributed to psychological and behavioral factors and processes associated with the treatment [43]. They conclude that a consistent set of predictors has not yet been identified.

Examine the volume of dietetic health care required for effect

Further research is necessary to examine how many consultations and frequency of consultations per dietetic treatment are most beneficial for a patient's health outcome. This may help improve evidence based dietetic guidelines on the volume of dietetic health care provided to target patient groups, and consequently prevent under- and over-treatment and reduce unwanted variation between practices. Additionally, this may also help to create more uniformity in guidelines on referrals for dietary advice.

Further investigation of the effectiveness and outcome of dietetic health services use

This thesis shows modest effects from dietetic treatment in overweight patients on evaluated health status and perceived health status (chapter 7 and 8). The long-term effects of dietetic treatment however remain unclear. Additionally, it is important to focus on the outcome of dietetic treatment for other patient groups, since dietitians have a broader population of interest. We recommend that future studies should focus on the development of patient-centered outcome measures, as patient centered health care is stimulated on a large basis in the Dutch health care system and dietitians are increasingly required to demonstrate their effectiveness. A literature review showed that very few studies in the field of dietetics have addressed patient involvement in the determination of outcome [44]. Therefore it is important to identify what outcomes are desired and valued by the patient. Subsequently, software providers could include the option for standard registration of outcome measures in software packages for dietitians. This

increases the possibility for future research based on electronic health records, and improve the transparency of dietetic care and patient awareness.

Investigate the cost-effectiveness of dietary advice provided by dietitians or by other methods or other disciplines

In examining the effectiveness of dietetic treatment, future studies should also focus on examining the consequences of substituting dietary advice by using other methods or other disciplines. Substitution of care was frequently reported by dietitians as a negative consequence of the introduction of working in disease management programs financed by bundled payments (chapter 2). However, the cost-effectiveness and effects on quality of care for patients treated within these programs remains unclear. The cost effectiveness of dietetic treatment was examined in 2012 by SEO [45]. They concluded that dietetic treatment of patients with obesity and obesity-related diseases was very cost effective. However, this report had some substantial methodological limitations which may have overestimated the results. More research is necessary given the lack of generalizability of these results in to daily practice and the fact that the results do not provide insight into the cost-effectiveness of dietitians in comparison to other care givers.

Main conclusions

This thesis showed that several factors could influence people's use of dietetic health services, i.e. environmental aspects, population characteristics, and outcome. In general, it is the responsibility of patients, general practitioners, healthcare insurers, policy makers, and dietitians to improve weight management outcomes. About half of the Dutch population is medically in need of weight-related care. Many of them are not planning on losing weight and are not aware of being overweight. Regular self-weighing may be helpful to create accurate weight perceptions and contribute to weight loss maintenance. Furthermore, many overweight people who are planning to lose weight do not intend to use weight-related care. In the cases where individual weight-loss attempts do not succeed, it is important to start weight-related care. General practitioners can play an important role in this, for example by having more conversations with

patients about what is a healthy weight, focusing on their patients' motivation for change and to refer for dietary treatment. Health care insurers and policy makers should provide sufficient reimbursement for dietary advice, as many patients are not able or willing to pay for dietetic treatment. This may help to limit the threshold to the dietitian's office. In the cases where patients have decided to visit a dietitian, their weight-loss effects are modest but clinically relevant after six months of treatment. Therefore, the results of this thesis showed that dietitians contribute to the reduction of overweight and obesity. For dietitians it is, among others, important to keep focusing on their patients' motivation for behavioral change. Future studies may focus on examining how many consultations per dietetic treatment are beneficial for patients' health outcome. This may help improve evidence based dietetic guidelines on the volume of dietetic health care with target patient groups, and consequently prevent under and over-treatment and reduce unwanted variation between practices. Additionally, more research is necessary to investigate the long term (cost-) effectiveness and outcome of dietetic health services use.

References

1. World Health Organization. Noncommunicable diseases country profiles 2011. Geneva: WHO, 2011.
2. World Health Organization. Obesity and overweight. Fact sheet N°311. Geneva: WHO, 2013.
3. Mertens IL, Van Gaal LF. Overweight, obesity, and blood pressure: the effects of modest weight reduction. ObesRes. 2000;8(3):270-8.
4. Yu-Poth S, Zhao G, Etherton T, Naglak M, Jonnalagadda S, Kris-Etherton PM. Effects of the National Cholesterol Education Program's Step I and Step II dietary intervention programs on cardiovascular disease risk factors: a meta-analysis. AmJClinNutr. 1999;69(4):632-46.
5. Dutch Institute for Health Improvement (CBO). Richtlijn diagnostiek en behandeling van obesitas bij volwassenen en kinderen [Guideline diagnostics and treatment of obesity in adults and children]. Utrecht: Van Zuiden Communications; 2008.
6. Andersen RM. Revisiting the behavioral model and access to medical care: does it matter? JHealth SocBehav. 1995;36(1):1-10.
7. Schoen C, Hayes SL, Radely DC, Collins SR. Access to primary and preventive health care across states prior to the coverage expansions of the Affordable Care Act. Issue Brief (Commonw Fund). 2014;17:1-14.
8. Robson T, Blackwell D, Waine C, Kennedy R. Factors affecting the use of dietetic services by patients with diabetes mellitus. Diabetic medicine. 2001;18(4):295-300.
9. Tol J, Swinkels ICS, Koppes L. Zorg door de diëtist. Jaarcijfers 2013 en trendcijfers 2009-2013 [Dietetic healthcare. Annual statistics 2013 and trends 2009-2013]. Utrecht: NIVEL, 2014.
10. Bradshaw C. Does the employment of an on-site dietitian improve the uptake of dietetic care in general practice diabetes clinics? Practical Diabetes International. 1994;11(5):213-4.
11. Tol J, Swinkels ICS, Veenhof C. Al voor invoering van directe toegang diëtetiek ging één op de zeven cliënten op eigen initiatief naar de vrijgevestigde diëtist. Utrecht: NIVEL, 2011.
12. de Jong J. Explaining medical practice variation: social organization and institutional mechanisms. Utrecht: NIVEL, 2009.

13. Dansinger ML, Tatsioni A, Wong JB, Chung M, Balk EM. Meta-analysis: the effect of dietary counseling for weight loss. Ann Intern Med. 2007;147(1):41-50.
14. Finkler E, Heymsfield SB, St-Onge MP. Rate of Weight Loss Can Be Predicted by Patient Characteristics and Intervention Strategies. JAmDietAssoc. 2011.
15. Dalle Grave R, Calugi S, Molinari E, Petroni ML, Bondi M, Compare A, et al. Weight loss expectations in obese patients and treatment attrition: an observational multicenter study. Obes Res. 2005;13(11):1961-9.
16. Inelmen EM, Toffanello ED, Enzi G, Gasparini G, Miotto F, Sergi G, et al. Predictors of drop-out in overweight and obese outpatients. Int J Obes (Lond). 2005;29(1):122-8.
17. Dalle Grave RD, Suppini A, Calugi S, Marchesini G. Factors associated with attrition in weight loss programs. Int J Behav Consult Ther. 2006;2(3):341-53.
18. Wing RR, Lang W, Wadden TA, Safford M, Knowler WC, Bertoni AG, et al. Benefits of modest weight loss in improving cardiovascular risk factors in overweight and obese individuals with type 2 diabetes. Diabetes Care. 2011;34(7):1481-6.
19. Swinburn B, Egger G, Raza F. Dissecting obesogenic environments: the development and application of a framework for identifying and prioritizing environmental interventions for obesity. Prev Med. 1999;29(6 Pt 1):563-70.
20. Asada Y, Kephart G. Equity in health services use and intensity of use in Canada. BMC Health Serv Res. 2007;7:41.
21. Butryn ML, Phelan S, Hill JO, Wing RR. Consistent self-monitoring of weight: a key component of successful weight loss maintenance. Obesity (Silver Spring). 2007;15(12):3091-6.
22. Linde JA, Jeffery RW, French SA, Pronk NP, Boyle RG. Self-weighing in weight gain prevention and weight loss trials. Ann Behav Med. 2005;30(3):210-6.
23. Raynor HA, Jeffery RW, Ruggiero AM, Clark JM, Delahanty LM. Weight loss strategies associated with BMI in overweight adults with type 2 diabetes at entry into the Look AHEAD (Action for Health in Diabetes) trial. Diabetes Care. 2008;31(7):1299-304.
24. Cousins JH, Rubovits DS, Dunn JK, Reeves RS, Ramirez AG, Foreyt JP. Family versus individually oriented intervention for weight loss in Mexican American women. Public Health Rep. 1992;107(5):549-55.

25. Hu G, Tian H, Zhang F, Liu H, Zhang C, Zhang S, et al. Tianjin Gestational Diabetes Mellitus Prevention Program: study design, methods, and 1-year interim report on the feasibility of lifestyle intervention program. Diabetes ResClinPract. 2012;98(3):508-17.
26. Pritchard DA, Hyndman J, Taba F. Nutritional counselling in general practice: a cost effective analysis. J EpidemiolCommunity Health. 1999;53(5):311-6.
27. Ramsay LE, Ramsay MH, Hettiarachchi J, Davies DL, Winchester J. Weight reduction in a blood pressure clinic. BrMedJ. 1978;2(6132):244-5.
28. Smith AW, Borowski LA, Liu B, Galuska DA, Signore C, Klabunde C, et al. U.S. primary care physicians' diet-, physical activity-, and weight-related care of adult patients. Am J Prev Med. 2011;41(1):33-42.
29. Jay M, Gillespie C, Schlair S, Sherman S, Kalet A. Physicians' use of the 5As in counseling obese patients: is the quality of counseling associated with patients' motivation and intention to lose weight? BMC Health Serv Res. 2010;10:159.
30. Nicholas LG, Pond CD, Roberts DC. Dietitian-general practitioner interface: a pilot study on what influences the provision of effective nutrition management. Am J Clin Nutr. 2003;77(4 Suppl):1039s-42s.
31. Martins RK, McNeil DW. Review of Motivational Interviewing in promoting health behaviors. ClinPsycholRev. 2009;29(4):283-93.
32. Sonntag U, Brink A, Renneberg B, Braun V, Heintze C. GPs' attitudes, objectives and barriers in counselling for obesity--a qualitative study. Eur J Gen Pract. 2012;18(1):9-14.
33. Sonntag U, Wiesner J, Fahrenkrog S, Renneberg B, Braun V, Heintze C. Motivational interviewing and shared decision making in primary care. Patient Educ Couns. 2012;87(1):62-6.
34. Partnerschap Overgewicht Nederland. Nutritional care module Amsterdam2012. Available from: http://www.nvdietist.nl/temp/122128926/Zorgmodule_Voeding_Amsterdam_2012_geautoriseerde_definitieve_versie.pdf.
35. Miller WR, Rollnick S. Motiverende gespreksvoering; mensen helpen veranderen [Motivational interviewing; helping people change]. 3 ed: Ekklesia; 2014.
36. Middleton KM, Patidar SM, Perri MG. The impact of extended care on the long-term maintenance of weight loss: a systematic review and meta-analysis. Obes Rev. 2012;13(6):509-17.

37. Sodlerlund A, Fischer A, Johansson T. Physical activity, diet and behaviour modification in the treatment of overweight and obese adults: a systematic review. Perspect Public Health. 2009;129(3):132-42.
38. The Ministry of Health Welfare and Sport. Onderzoeken naar verhoging eigen risico en zorgmijding [Studies at increase of own-risk and health care avoidance]. The Hague: 2014.
39. The Ministry of Health Welfare and Sport. Kiezen voor gezond leven 2007 - 2010. The Hague: 2006.
40. Tweede Kamer der Staten-Generaal. Vragen gesteld door de leden der Kamer, met de daarop door de regering gegeven antwoorden. 2012 [cited November 4, 2014]. Available from: https://zoek.officielebekendmakingen.nl/ah-tk-20112012-1704.html.
41. The Ministry of Health Welfare and Sport. Landelijke nota gezondheidsbeleid. Gezondheid dichtbij. [National nota healthcare policy. Health nearby]. The Hague: VWS, 2011.
42. World Health Organization. Diet, Nutrition and the prevention of chronic diseases. Geneva: WHO, 2003.
43. Moroshko I, Brennan L, O'Brien P. Predictors of dropout in weight loss interventions: a systematic review of the literature. Obes Rev. 2011;12(11):912-34.
44. Jackson JA, Kinn S, Dalgarno P. Patient-centred outcomes in dietary research. JHumNutrDiet. 2005;18(2):83-92.
45. Lammers M, Kok L. Kosten-batenanalyse diëtetiek. SEO Economisch Onderzoek 2012.

Summary

Summary

Weight management in primary health care is an important social theme given the high prevalence of overweight and obesity. These conditions are important risk factors for diabetes, heart disease and several types of cancers. These non-communicable diseases are increasing around the world and are the biggest cause of death globally. Therefore, an effective approach is important.

Nowadays, the market provides many weight-loss strategies for people willing to lose weight. However, many people find it difficult to lose weight and persist their new weight on the long term. Therefore, it is important for patients to offer effective weight loss programs. The focus should be on a combination of nutrition, physical activity and behavioral modification. The dietitian in primary health care regularly encounters patients with overweight and obesity. Given the high prevalence of these conditions one may believe that this is an indicator for a high use of dietetic health care. However, this not the case. An explanation for this is important for further development of weight management in primary health care.

The aim of the present thesis is to increase understanding of dietetic health care utilization in primary care and the factors that are associated with it. The literature describes several models that help understand health services use. A frequently used model of health services use is Andersen's health behavioural model. This model suggests that health services use may be influenced through environmental aspects, for example the influence of the health care insurer or the general practitioner on use of dietetic services. Furthermore population characteristics and people's health behavior may also influence health services use. Lastly, the outcome of dietetic treatment, such as the effect of treatment and patient satisfaction may also influence future health services use. The research questions of this thesis are related to the different factors that may be associated with dietetic health care utilization. Chapter 2 – 4 focus on different environmental aspects of dietetic health care utilization. Chapter 5 and 6 examine the association between population characteristics and health behavior. Chapter 7 and 8 focus on the

outcome of dietetic treatment. The last chapter (chapter 9) discusses the most important findings of this thesis.

Main findings

Chapter 2 describes the introduction of the bundled payments within dietetic health care. Bundled payments were introduced as part of a new strategy to redesign chronic care delivery. Hereby, disease management programs negotiate with healthcare insurers and healthcare providers about the price for a bundle of services for several chronic conditions. Therefore, introduction of the bundled payments may have influenced the supply of dietetic services.

This chapter will answer the following research question:

- *To what extent are Dutch primary healthcare dietitians involved in disease management programs financed through bundled payments and what are their experiences and opinions with regard to working in these programs?*

In September 2011, a random sample of 800 Dutch dietitians working in primary care were invited by email to complete an online questionnaire (34% responded). The results showed that two-thirds of the Dutch dietitians participated in a disease management programme, mostly for diabetes care. Positive experiences were an increase in multidisciplinary collaboration, efficiency of healthcare, and transparency of healthcare quality. The most frequently mentioned negative aspect of the bundled payment scheme was an increase in administrative tasks as a consequence of the necessity of registering the same data in multiple IT-applications. Furthermore, there was a lack of payment for patients with co- or multi-morbidity within the bundled fee. This problem occurs as the bundled payment scheme has a single-disease focus. Therefore, working with single-disease bundled payments for specific chronic conditions might result in a compartmentalized health care delivery system for patients with co- or multi-morbidity. Another important disadvantage for the dietitian was that dietetic care was substituted by other disciplines, such as the practice nurse. The effect of substitution of dietary counselling by other disciplines needs

further examination, since this may have a negative effect on quality of treatment.

Chapter 3 describes the role of the referrer in dietetic health care utilization. General practitioners (GPs) play an important role in both the prevention and management of overweight and obesity. Current general practice guidelines in the Netherlands allow room for GPs to execute their own weight management policy, which may influence the referral rate to dietitians.

This chapter answers the following research question:

- *Is there variation in general practitioners' referral policy of patients with obesity to other health care professionals for nutritional or dietary advice?*

In this study, data were collected by means of a questionnaire measuring GPs' weight management policy. 800 Dutch GPs were asked to complete the questionnaire (39% responded). Most GPs reported to refer about half of their obese patients for nutritional or dietary advice. Preferably, they referred these patients to a dietitian. This referral percentage varied widely between GPs. Overweight or obese GPs (BMI≥25) were significantly associated to a lower referral percentage for obesity management compared to GPs with a healthy weight. In contrast, higher referral rates were reported by GPs' who had frequent contact with a dietitian. Lastly, higher referral rates were reported by GPs' who believed that they should educate patients with obesity about the possible weight-related health risks.

Further results showed that GPs were less likely to discuss weight with patients without weight-related comorbidities or with moderately overweight patients compared to obese patients. In general, weight was more frequently discussed by GPs aged over 48 years or who believed that promoting a healthy weight is an important part of GP care.

In the context of preventive medicine in general practice, GPs' discussion of weight with moderately overweight patients deserves more attention, especially from younger GPs. Strengthening interdisciplinary collaboration between GPs and dietitians could increase the referral percentage for dietary

treatment.

Chapter 4 evaluates the effect of reimbursement policy on use of dietetic health services. In the Netherlands, in 2011 and 2013 dietary advice was reimbursed for all medical indications by 4 and 3 hours, respectively. In 2012, the year in between, the insurance covered for up to four hours of dietary advice per calendar year was restricted to patients with diabetes mellitus type 2, cardiovascular risks or patients with chronic obstructive pulmonary disease who were treated within a multidisciplinary coordinated care program, such as a disease management program.

This chapter answers the next research questions:

- *What is the influence of changes in reimbursement for dietary advice on the number of patients visiting the dietitian?*
- *What type of population and practice characteristics are associated with the number of patients visiting the dietetic practice after limiting reimbursement for dietary advice?*

For this longitudinal observation study data were used from electronic health records of 65,847 patients who consulted a dietitian between 2011 and 2013. A total of 68 private dietetic practices in primary healthcare participated. Results showed that changes in reimbursement policy had a major influence on the use of dietetic health services. The average number of visiting patients significantly decreased in 2012 and 2013 compared to 2011. The decrease was 32.1% in 2012 and 19.8% in 2013. Moreover, the decrease varied widely between practices. Compared to 2011, relatively less younger people, females and persons who lived in areas with a lower socioeconomic status score consulted the dietitian in 2012. This was also the case for those with other conditions than diabetes or copd, such as cardiovascular risk factors. Practice characteristics explained 43% of the variation between practices. The number of patients visiting dietetic practices was significantly higher for practices that reported to be satisfied with collaboration with the general practitioner (in 2012) compared to practices that were not satisfied about this collaboration.

In conclusion, limiting reimbursement of dietary advice only for patients with chronic conditions results in inequitable access, fewer treatments for patients with cardiovascular risks, malnutrition or gastrointestinal tract disorders and a reduction in workforce of dietitians. For dietetic practices, good collaboration with general practitioners positively influences coping with these changes in reimbursement of dietary advice.

Chapter 5 investigates the association between population characteristics and health behavior. For example, readiness to lose weight and the intention to use self-care or weight-related care by a caregiver, such as a dietitian. Obesity guidelines recommend increasing the level of weight-related care for persons with elevated levels of weight-related health risk (WRHR). However, there seems to be a discrepancy between medical need for and use of weight-related care.

This chapter answers the next research questions:

- *What type of population characteristics are associated with readiness to lose weight in an overweight population?*
- *What type of population characteristics are associated with the intention to use weight-related care in an overweight population ready to lose weight?*

This survey collected data using an online self-administered questionnaire sent to a population-representative sample of 1,500 Dutch adults (n=861 responded). Data were used from overweight individuals (n=445). In sum, the following population characteristics were associated with a higher odds for readiness to lose weight: persons with a higher educational level, unmarried persons, persons with better perceptions and expectations of dietitians, and at last, persons with an accurate perception of their bodyweight.

Further results showed that need for weight loss was associated with the intention to use weight-related care. For example, having the intention to use weight-related care was significantly higher for those with a moderately, severely, or very severely elevated level of WRHR compared to those with a mild WRHR. In addition, persons who perceived their general health as poor

more often intended to use weight-related care compared to persons who perceived to have good or excellent general health.

In conclusion, it was shown that many Dutch adults who are medically in need of weight-related care are ready to lose weight. Most adults intend to lose weight individually. Only a few intend to use weight-related care. For obesity prevention, it is important to monitor individual weight change and weight-loss plans, and if needed to refer for obesity management. However, many people are not ready to lose weight. For this group, strategies for behaviour change may depend on WRHR, perceptions of weight and perceptions of dietitians, educational level and marital status. For this group, increasing the awareness of the seriousness of their condition and offering individually appropriate weight management programmes could contribute to the prevention of obesity.

Chapter 6 investigates the association between predisposing characteristics on the intensity of dietetic health services use. In dietetic health care utilization, the intensity of health services used may vary between patients and between dietitians. Substantial inter-practitioner variation may suggest a potential to increase efficiency and improve quality. Until now, inter-practitioner variation in the field of dietetics has not been examined.

This chapter answers the following research questions:

- *What are the sources of variability in the number of consultations per dietetic treatment?*
- *What type of predisposing characteristics are associated with the number of consultations per dietetic treatment?*

For this observational study, data were used from 6,496 patient electronic health records of 27 dietitians working in solo practices located throughout the Netherlands. Patients were treated between 2006 and 2009. The results showed that adjusted for demographics, patients' initiative and patients' health-related variables, the mean number of patients' consultations varied widely between dietitians, from 2.3 to 10.1 consultations per treatment. 28% of the variation was explained by the variables in this study. Dietetic health services use was associated with demographics (age, gender), social

structure (educational level, ethnicity), need (initiative for treatment, nutrition related conditions) and former use of dietetic health services. Significantly more dietetic healthcare was used by older patients, females, the native Dutch, patients with a history of dietetic healthcare, patients who started the treatment on their own initiative, patients with multiple diagnoses, overweight, or binge eating disorder.

In conclusion, considerable variation in number of consultations per dietetic treatment is attributed to dietitians. Some of this inter-practitioner variation was reduced after adjusting for case-mix. Further research is necessary to study the relation between inter-practitioner variation and the effectiveness and quality of dietetic treatment.

Chapter 7 investigates the association between predisposing characteristics and intensity of dietetic health services use on evaluated health status in overweight patients. Little research has been conducted to examine the influence of the dietitian on patients' weight loss. Possibly, there may be differences between dietitians that could lead to different weight loss outcomes. Therefore, more studies in 'real life' situations are recommended. For example, research in a primary health care setting to observe the outcome of dietetic treatment and possible differences between dietitians.

This chapter answers the following research questions:

- *What is the effect of dietetic treatment in primary care on overweight patients' mean change in body mass index?*
- *What are the sources of variability in overweight patients' change in BMI?*
- *What is the association of predisposing characteristics and duration of dietetic treatment on overweight patients' change in BMI?*

This observational study was based on data from electronic health records concerning 3,960 overweight adult patients (BMI≥25) who received usual care from 32 registered dietitians between 2006 and 2012. Results showed that patients' BMI significantly decreased by 0.94 kg/m² on average during treatment. An additional reduction of 0.8 kg/m² in patients' mean change in BMI was observed in patients treated for longer than six months. BMI

further decreased by 0.06 kg/m² for each additional unit in initial BMI above 31.6. Most (97%) variability in BMI change was attributed to patients and 3% to dietitians. Inter-practitioner variation seemed rather low. However, the absolute amount of variation expressed in clinically meaningful units, showed that the average BMI change in the current study ranged from -1.41 to -0.62 kg/m² between dietitians. Therefore many patients did not achieve clinically relevant outcomes of treatment. Part of the variance between patients (11%) and dietitians (30%) was explained by patient socio-demographic characteristics, nutrition-related health aspects, initial body weight and treatment duration.

It can be concluded that dietetic treatment in primary care lowers BMI in overweight patients. Patients' change in BMI is rather similar between dietitians. Greater BMI reductions were observed in those with a high initial BMI and those treated for at least six months. Future research is necessary to study long-term effects of weight loss after treatment by primary health care dietitians. Especially, since many patients drop out of treatment prematurely.

Chapter 8 describes the association of population characteristics, intensity of dietetic health services use and perceived health outcomes on satisfaction with dietetic treatment. More knowledge about patient experience of dietetic treatment and aspects related to patient satisfaction may help to improve the quality of dietetic treatment.

The following research questions are answered in this chapter:

- *What is the association of population characteristics and dietetic health care use on patients' experiences with dietitians?*
- *What is the association of patients' experiences and expectations with dietitians on overall satisfaction with dietetic treatment?*

This survey study questioned patients who receive or have received dietary treatment from a dietitian on their experiences with dietetic health care and their satisfaction with the dietitian. Respondents generally reported positive experiences with dietitians' communication skills, interpersonal skills, and actions to improve engagement and enablement. Almost half of the respondents did not report sufficient health benefits by dietetic treatment.

Significantly higher experience scores were reported by those who were treated for longer than 12 months. Overall, 70% of the respondents were satisfied with dietetic treatment. Respondents with met expectations and higher experience scores have significantly higher odds of satisfaction.

In conclusion, patient satisfaction with dietetic services can increase by improving patients' expectations and experiences. This study shows perspectives for improvement of several aspects of dietetic care, especially regarding the health benefits of dietetic treatment.

Chapter 9 discusses the main findings of this thesis and report on methodological strengths and limitations. Moreover, implications of the findings are discussed for patients, health care professionals, health care insurers, policy makers, and researchers. Furthermore, attention has been given to the relevance of the results.

A strength of this thesis is the versatility of the used methods for data collection, where both surveys among different target groups and data from electronic health records of dietetic practices in primary health care were used. A limitation of the used methods in this thesis is that it was often not possible to examine the direction of the observed effects (cause-effect).

The results of this thesis show that several factors are associated with dietetic health services use. In general, patients, general practitioners, dietitians, healthcare insurers and policy makers have a shared responsibility to improve weight management outcomes in primary health care. Furthermore different recommendations are made. For example, weight-related care can be recommended for overweight persons in case individual weight-loss attempts do not succeed. General practitioners can play an important role in this. For example, by having more conversations with patients about what is a healthy weight, and to refer for dietary treatment. Furthermore, it is recommended that health care insurers and policy makers should continue to take care of sufficient reimbursement for dietary advice. For dietitians it is, among others, important to keep focusing on their patients' motivation for behavioral change. Further research should focus on examining how many consultations per dietetic treatment are necessary to

improve patients' health. At last, more research is needed to investigate the long term effectiveness of dietetic treatment.

Samenvatting

Samenvatting (summary in Dutch)

Gewichtsmanagement in de eerstelijnsgezondheidszorg is een belangrijk maatschappelijk thema gezien de hoge prevalentie van overgewicht en obesitas. Deze aandoeningen zijn belangrijke risicofactoren voor het ontstaan van diabetes, hartziekten en verschillende soorten kanker. De omvang van dit soort 'niet overdraagbare ziekten' neemt wereldwijd toe en behoort tot de belangrijkste doodsoorzaken. Een effectieve aanpak is dan ook van belang.

Tegenwoordig zijn er voor mensen die willen afvallen veel verschillende mogelijkheden. Toch vinden veel mensen het moeilijk om (blijvend) af te vallen. Daarom is het belangrijk dat er voor deze mensen effectieve afvalprogramma's worden aangeboden. De focus moet daarbij liggen op een combinatie van voeding, lichamelijke activiteit en gedragsverandering. De diëtist in de eerstelijnsgezondheidzorg behandelt regelmatig mensen met overgewicht en obesitas. Gezien de hoge prevalentie van deze aandoeningen zou men zeggen dat dit ook gepaard gaat met een hoog zorggebruik bij de diëtist. Dit is echter niet het geval. Een verklaring hiervoor is van belang voor de verdere ontwikkeling van gewichtsmanagement in de eerstelijnsgezondheidszorg.

Het doel van dit proefschrift is om het zorggebruik bij de diëtist in de eerstelijnsgezondheidszorg en de factoren die hiermee geassocieerd zijn beter te begrijpen. De literatuur beschrijft verschillende modellen die bijdragen aan een beter begrip van het gezondheidszorggebruik. Een veel gebruikt model hiervoor is het 'Andersen's health behavioural model'. Dit model suggereert dat het gebruik van zorg kan worden beïnvloed door omgevingsfactoren zoals de invloed van de verzekeraar of de huisarts op het gebruik van diëtetiek. Daarnaast kan het gebruik van zorg worden beïnvloed door karakteristieken van de bevolking en het gezondheidsgedrag van mensen. Ten slotte kan de uitkomst van de diëtistische zorg, zoals het effect van de diëtistische behandeling en patiënttevredenheid, het toekomstig gebruik beïnvloeden. De onderzoeksvragen die in dit proefschrift centraal staan hebben betrekking op de verschillende factoren die mogelijk geassocieerd zijn met het diëtistisch zorggebruik. De hoofdstukken 2 tot en

met 4 richten zich op de verschillende omgevingsfactoren van diëtistisch zorggebruik. Hoofdstuk 5 en 6 onderzoeken de associatie tussen populatie karakteristieken en gezondheidsgedrag. Hoofdstuk 7 en 8 focussen op de uitkomst van de diëtistische behandeling. In het laatste hoofdstuk (hoofdstuk 9) worden de belangrijkste resultaten van dit proefschrift bediscussieerd.

Belangrijkste bevindingen

Hoofdstuk 2 beschrijft de introductie van integrale bekostiging binnen de diëtistische zorg. De invoering van integrale bekostiging maakt onderdeel uit van een nieuwe aanpak om de zorg voor chronisch zieken te herorganiseren. Hierbij onderhandelen zorggroepen in de eerstelijnsgezondheidszorg met verzekeraars en zorgverleners over de prijs voor een bepaald pakket aan zorg. De introductie van integrale bekostiging is mogelijk van invloed op de vraag naar diëtetiek.

Het hoofdstuk beantwoordt de volgende onderzoeksvraag:

- *In welke mate nemen diëtisten in de eerstelijnsgezondheidszorg deel aan zorggroepen die integraal bekostigd worden en wat zijn hun ervaringen en meningen ten aanzien van het werken in deze groepen?*

In september 2011 is een gerandomiseerde groep van 800 Nederlandse diëtisten werkzaam binnen de eerstelijnsgezondheidszorg uitgenodigd om per e-mail een online vragenlijst in te vullen (34% respons). De resultaten lieten zien dat tweederde van de Nederlandse diëtisten deelnam aan een zorggroep, voornamelijk voor diabeteszorg. Positieve ervaringen waren een verhoging van de multidisciplinaire samenwerking, effectievere gezondheidszorg en meer inzicht in de kwaliteit van zorg. Het meest genoemde negatieve aspect van integrale bekostiging was een verhoging in administratieve werkzaamheden als gevolg van dubbele administratie in verschillende softwareprogramma's. Daarnaast was er binnen de integraal bekostigde zorg onvoldoende financiële vergoeding voor patiënten met meervoudige aandoeningen. Dit is het gevolg van het feit dat integrale bekostiging zich richt op de zorgverlening voor één specifieke aandoening.

Daardoor kan integrale bekostiging van zorg voor specifieke chronische ziekten leiden tot gefragmenteerde zorg voor patiënten met co- of multimorbiditeit. Een ander belangrijk nadeel voor de diëtist was dat de dieetadvisering werd overgenomen door andere disciplines, zoals de praktijkondersteuner. Het effect van substitutie van dieetadvisering door andere zorgverleners moet verder worden onderzocht aangezien het een negatief effect kan hebben op de kwaliteit van de behandeling.

Hoofdstuk 3 beschrijft de rol van de verwijzer bij het diëtistisch zorggebruik. Huisartsen spelen een belangrijke rol spelen bij preventie en management van overgewicht en obesitas. De huidige richtlijnen bieden voor huisartsen de ruimte om hun eigen gewichtsmanagement uit te voeren en dit is mogelijk van invloed op het verwijspercentage naar diëtisten.

Het hoofdstuk beantwoordt de volgende onderzoeksvraag:

- *Is er variatie in het verwijsbeleid van huisartsen bij patiënten met obesitas naar andere zorgverleners voor voedings- of dieetadvies?*

Voor deze studie zijn data verzameld via een vragenlijst over het gewichtsmanagement van huisartsen. 800 Nederlandse huisartsen zijn gevraagd om de vragenlijst in te vullen (39% response). De meeste huisartsen gaven aan dat zij ongeveer de helft van hun patiënten met obesitas voor voedings- of dieetadvies verwezen. Bij voorkeur verwezen zij deze patiënten naar een diëtist. Dit verwijspercentage varieerde sterk tussen huisartsen. Huisartsen met overgewicht of obesitas (BMI≥25) verwezen statistisch significant minder vaak voor obesitasmanagement dan huisartsen met een gezond gewicht. Daarentegen werden hogere verwijspercentages opgegeven door huisartsen die frequent contact met een diëtist hadden. Tenslotte werden hogere verwijspercentages gerapporteerd door huisartsen die vonden dat zij patiënten met obesitas voorlichting moeten geven over de mogelijke gezondheidsrisico's.

De overige resultaten lieten zien dat huisartsen minder vaak het gewicht ter sprake brengen bij patiënten zonder gewichtsgerelateerde comorbiditieiten of

patiënten met matig overgewicht vergeleken met patiënten met obesitas. Over het algemeen brachten huisartsen ouder dan 48 jaar of huisartsen die geloofden dat het bevorderen van een gezond gewicht een belangrijk onderdeel is van huisartsenzorg, het overgewicht vaker ter sprake.

In de context van preventieve zorg binnen de huisartsenpraktijk verdient het bespreken van het lichaamsgewicht bij patiënten met matig overgewicht meer aandacht. Dit geldt in het bijzonder voor jonge(re) huisartsen. Het versterken van de interdisciplinaire samenwerking tussen huisartsen en diëtisten kan het verwijspercentage voor dieetbehandeling verhogen.

Hoofdstuk 4 evalueert het effect van het vergoedingsbeleid op het gebruik van diëtetiek. In Nederland werd in 2011 vier uur en in 2013 drie uur dieetadvisering vergoed voor personen met een medische indicatie. In 'tussenjaar' 2012 werd dieetadvisering alleen nog voor maximaal vier uur per kalenderjaar vergoed als dit onderdeel was van gecoördineerde multidisciplinaire zorg (zoals een zorggroep) voor patiënten met diabetes mellitus type 2, een verhoogd cardiovasculair risico of chronische obstructieve longziekten.

Het hoofdstuk beantwoordt de volgende onderzoeksvragen:

- *Wat is de invloed van de wijzigingen in vergoeding van dieetadvisering op het aantal patiënten dat de diëtist bezocht?*
- *Welke populatie- en praktijkkenmerken zijn geassocieerd met het aantal patiënten dat de diëtetiekpraktijk bezocht na de verminderde vergoeding voor dieetadvisering?*

Voor deze longitudinale studie zijn van 65.847 patiënten die tussen 2011 en 2013 een consult bij de diëtist hebben gehad, data gebruikt uit elektronische patiëntendossiers. In totaal namen er 68 vrijgevestigde diëtistenpraktijken in de eerstelijnsgezondheidszorg deel. De resultaten lieten zien dat de veranderingen in het vergoedingsbeleid een grote invloed hadden op het gebruik van diëtetiek. Het gemiddelde aantal patiënten dat de diëtist bezocht, was in 2012 en 2013 vergeleken met 2011 significant gedaald. In 2012

betrof de daling 32,1% en in 2013 19,8%. Daarbij was er een sterk verschil tussen praktijken. In vergelijking tot 2011 bezochten in 2012 jongeren, vrouwen en personen die in een wijk met een relatief lage sociaal economische status score woonden, minder vaak de diëtist. Patiënten met andere aandoeningen dan diabetes of copd, zoals cardiovasculaire risicofactoren, bezochten de diëtist eveneens minder vaak. Praktijkkenmerken verklaarden 43% van de verschillen tussen praktijken. Het aantal patiënten dat de diëtist had bezocht was significant hoger bij praktijken die gerapporteerd hadden tevreden te zijn over de samenwerking met de huisarts (in 2012) dan praktijken die hier ontevreden over waren.

De conclusie is dat het verminderen van de vergoeding van dieetadvisering voor mensen met een chronische aandoening resulteert in ongelijke toegang, minder behandeling van patiënten met cardiovasculaire risico's, ondervoeding of maag- darmaandoeningen en een vermindering van de werkgelegenheid voor diëtisten. Een goede samenwerking met huisartsen heeft voor diëtistenpraktijken een positieve invloed op het omgaan met dergelijke veranderingen in de vergoeding van dieetadvisering.

Hoofdstuk 5 onderzoekt de associatie tussen populatiekenmerken en het gezondheidsgedrag. Hierbij kan worden geacht aan de mate van bereidheid om af te vallen en de intentie om zelfzorg of gewichtsgerelateerde zorg van een zorgverlener zoals de diëtist, te gebruiken. De obesitas richtlijnen bevelen aan om de intensiteit van gewichtsgerelateerde zorg te verhogen bij personen met een verhoogd gewichtsgerelateerd gezondheidsrisico (GGR). Echter, er bestaat een discrepantie tussen de medische noodzakelijkheid en het gebruik van gewichtsgerelateerde zorg.

Dit hoofdstuk beantwoordt de volgende onderzoeksvragen:

- *Welke populatiekenmerken zijn geassocieerd met de mate waarin iemand met overgewicht bereid is om af te vallen?*
- *Welke populatiekenmerken zijn geassocieerd met de intentie van mensen met overgewicht die bereid zijn om af te vallen, om gewichtsgerelateerde zorg te ontvangen?*

Voor deze peiling zijn gegevens verzameld via een online zelfgerapporteerde vragenlijst die verstuurd is aan een representatieve groep van 1500 Nederlandse volwassenen (861 response). De data van personen met overgewicht zijn gebruikt (n=445). Samenvattend waren de volgende populatiekenmerken geassocieerd met een hogere waarschijnlijkheid tot bereidheid om te gaan afvallen: personen met een hoger opleidingsniveau, ongehuwde personen, personen met betere percepties en verwachtingen van diëtisten en tenslotte personen met een accurate perceptie van hun lichaamsgewicht.

De overige resultaten lieten zien dat de noodzaak om af te vallen geassocieerd was met de intentie om gewichtsgerelateerde zorg te gaan gebruiken. Het hebben van de intentie om gewichtsgerelateerde zorg te gaan gebruiken was bijvoorbeeld significant hoger bij personen met een gemiddeld verhoogd of sterk verhoogd GGR dan bij personen met een laag GGR. Daarnaast hadden personen die hun algemene gezondheid als slecht beoordeelden vaker de intentie om gewichtsgerelateerde zorg te gaan gebruiken dan personen die hun gezondheid als goed of uitstekend beoordeelden.

De conclusie is dat veel Nederlandse volwassenen waarbij gewichtsgerelateerde zorg noodzakelijk is ook daadwerkelijk bereid zijn om af te vallen. De meeste volwassenen hebben het plan om dit zelfstandig te doen. Een enkeling is van plan om hierbij gewichtsgerelateerde zorg te gebruiken. Ter preventie van obesitas is het daarom belangrijk om individuele gewichtsverandering en plannen om te gaan afvallen te monitoren en zo nodig te verwijzen voor obesitasmanagement. Toch zijn er ook nog veel volwassenen niet bereid om af te vallen. Iemands GGR, ideeën over het eigen lichaamsgewicht en over diëtisten, opleidingsniveau en huwelijkse staat zijn relevante factoren bij het bepalen van de strategie om de bereidheid te verhogen. Het (verder) bewust maken van de ernst van de aandoening en het aanbieden van individuele gewichtsmanagement programma’s zou bij deze groep kunnen bijdragen aan de preventie van obesitas.

Hoofdstuk 6 gaat in op de associatie tussen predisponerende kenmerken en de omvang van het diëtistisch zorggebruik. Bij het gebruik van diëtistische zorg kan de intensiteit van het zorggebruik wisselen tussen patiënten en diëtisten. Veel verschil tussen diëtisten kan betekenen dat de efficiëntie en kwaliteit van de zorg beter kan. Tot op heden is de variatie tussen diëtisten niet nader onderzocht.

Het hoofdstuk beantwoordt de volgende onderzoeksvragen:

- *Wat zijn de bronnen van variatie in het aantal consulten per diëtistische behandeling?*
- *Welke predisponerende kenmerken zijn geassocieerd met het aantal consulten per diëtistische behandeling?*

Voor deze observationele studie zijn van 27 diëtisten werkzaam binnen solopraktijken verspreid over Nederland gegevens uit 6496 elektronische patiëntendossiers verzameld. De behandeling vond plaats tussen 2006 en 2009. Uit de resultaten blijkt dat er tussen diëtisten grote verschillen zijn in het gemiddeld aantal consulten dat hun patiënten per behandeling ontvingen. Na correctie van de demografische kenmerken, behandelingsgerelateerde kenmerken en veel voorkomende gezondheidsproblemen, liep dit gemiddelde uiteen van 2,3 tot 10,1 consulten. 28% van deze verschillen kon met de kenmerken uit deze studie worden verklaard. De omvang van het diëtistisch zorggebruik was geassocieerd met demografische kenmerken (leeftijd en geslacht), sociale structuur (opleidingsniveau en etniciteit), noodzaak (initiatief voor de behandeling en voedingsgerelateerde aandoeningen) en eerder gebruik van diëtistische zorg. Significant meer diëtistische zorg was gebruikt door ouderen, vrouwen, autochtonen, patiënten die eerder al diëtistische behandeling hadden gehad, patiënten die op eigen initiatief kwamen en patiënten met meervoudige diagnoses, overgewicht of met de eetstoornis Binge Eating Disorder.
De conclusie luidt dat een groot deel van de verschillen in het aantal consulten per diëtistische behandeling kan worden toegeschreven aan de diëtisten zelf. Deze verschillen worden kleiner als rekening wordt gehouden met de invloed van verschillende variabelen. Nader onderzoek is nodig naar

de relatie tussen verschillen tussen diëtisten en de effectiviteit en kwaliteit van de diëtistische behandeling.

Hoofdstuk 7 onderzoekt de associatie tussen predisponerende kenmerken en de omvang van het diëtistisch zorggebruik op de gezondheidsstatus van patiënten met overgewicht. Er is weinig onderzoek uitgevoerd naar de invloed van de diëtist op het afvallen van de patiënt. De mogelijkheid bestaat dat er verschillen bestaan tussen diëtisten die kunnen leiden tot verschillende uitkomsten van gewichtsverlies. Daarom is het aanbevolen dat er meer onderzoek naar de dagelijkse praktijk wordt verricht. Hierbij kan worden gedacht aan onderzoek binnen de eerstelijnsgezondheidszorg waarbij de uitkomst van de diëtistische behandeling en de eventuele verschillen tussen diëtisten worden geobserveerd.

Het hoofdstuk beantwoordt de volgende onderzoeksvragen:

- *Wat is het effect van de diëtistische behandeling op het gemiddelde verschil in body mass index van patiënten met overgewicht binnen de eerstelijnsgezondheidszorg?*
- *Wat zijn de bronnen van variatie in de verandering van body mass index van patiënten met overgewicht?*
- *Wat is de associatie tussen de predisponerende kenmerken en de duur van de diëtistische behandeling versus de verandering van de body mass index van patiënten met overgewicht?*

Deze observationele studie is gebaseerd op gegevens uit elektronische patiëntendossiers van 3960 patiënten met overgewicht (BMI≥25) die tussen 2006 en 2012 reguliere zorg van 32 geregistreerde diëtisten ontvingen. De resultaten lieten zien dat de BMI van patiënten gedurende de behandeling significant daalde met gemiddeld 0,94 kg/m². Een verdere daling in BMI van 0,8 kg/m² was geobserveerd bij patiënten die langer dan zes maanden zijn behandeld. De BMI daalde daarnaast met 0,06 kg/m² voor iedere eenheid dat de BMI bij aanvang van de behandeling hoger was dan 31,6. De meeste variatie (97%) in BMI verandering was toe te kennen aan patiënten. De resterende 3% was toe te rekenen aan de diëtisten. De verschillen tussen

diëtisten leken klein. Echter, de absolute hoeveelheid aan variatie uitgedrukt in klinisch betekenisvolle waardes liet zien dat het gemiddelde BMI verschil in de huidige studie varieerde van 1,41 tot -0.62 kg/m² tussen diëtisten. Hierdoor hadden veel patiënten geen klinisch relevant resultaat van de behandeling. Een gedeelte van de verschillen tussen patiënten (11%) en diëtisten (30%) werd verklaard door sociaal demografische kenmerken van de patiënt, voedingsgerelateerde aandoeningen, gewicht bij aanvang van de behandeling en de duur van de behandeling.

De conclusie is dat het BMI bij patiënten met overgewicht wordt verlaagd door diëtistische behandeling in de eerstelijnsgezondheidszorg. Er zijn geen grote verschillen tussen diëtisten als gekeken wordt naar de verandering in BMI van hun patiënten. Het BMI daalt meer bij patiënten met een hoog BMI bij aanvang van de behandeling en bij patiënten die langer dan zes maanden worden behandeld. Nader onderzoek is nodig naar het lange-termijn effect van de diëtistische behandeling in de eerstelijnsgezondheidszorg. Dit is vooral van belang omdat veel patiënten voortijdig de behandeling beëindigen.

Hoofdstuk 8 beschrijft de associatie tussen populatiekenmerken, de omvang van het zorggebruik en de waargenomen gezondheidsuitkomsten op de mate van tevredenheid met de diëtistische behandeling. Meer kennis van patiëntervaringen met de diëtistische behandeling en aspecten gerelateerd aan patiënt tevredenheid kunnen namelijk helpen om de kwaliteit van de diëtistische behandeling te verbeteren

Het hoofdstuk beantwoordt de volgende onderzoeksvragen:

- *Wat is de associatie tussen populatiekenmerken en de omvang van de zorg op de ervaringen van patiënten met diëtisten?*
- *Wat is de associatie tussen de verwachtingen en ervaringen van patiënten met diëtisten op de mate van tevredenheid over de diëtistische behandeling?*

In deze peiling zijn patiënten die dieetbehandeling van een diëtist ondergingen of hebben ondergaan, gevraagd naar hun ervaringen met diëtistische zorgverlening en hun tevredenheid met de diëtist. Respondenten waren over het algemeen positief over de communicatieve vaardigheden, vaardigheden ten aanzien van bejegening en over de ondersteuning bij het zelfstanding uitvoeren van een dieet. Bijna de helft van de respondenten ervoer onvoldoende gezondheidsvoordelen van de diëtistische behandeling. Significant hogere ervaringsscores werden gerapporteerd door patiënten die langer dan 12 maanden waren behandeld. In totaal was 70% van de respondenten tevreden met de diëtistische behandeling. Respondenten met behaalde verwachtingen en hogere ervaringsscores hadden een significant hogere kans om tevreden te zijn met de diëtistische behandeling.

De conclusie luidt dat patiënttevredenheid met de diëtistische behandeling kan worden verhoogd door de verwachtingen en ervaringen van patiënten te verbeteren. Het onderzoek biedt perspectieven voor het verbeteren van een aantal aspecten van de dieetbehandeling vooral op het gebied van de behaalde gezondheidsvoordelen.

In **hoofdstuk 9** worden de belangrijkste resultaten van dit proefschrift bediscussieerd en worden de sterke en zwakke punten van de gebruikte methodes besproken. Verder worden de gevolgen van de resultaten voor patiënten, zorgverleners, zorgverzekeraars, beleidsmakers en onderzoekers ter discussie gesteld. Ook wordt er aandacht besteed aan de relevantie van de resultaten.

De kracht van dit proefschrift ligt in de veelzijdigheid van de gebruikte methodes voor dataverzameling waarbij zowel gebruik is gemaakt van vragenlijsten onder verschillende doelgroepen als van gegevens uit elektronische patiëntendossiers van diëtistenpraktijken binnen de eerstelijnsgezondheidszorg. De kanttekening hierbij is wel dat de richting van de gevonden effecten (oorzaak-gevolg) vaak niet kon worden onderzocht.

De resultaten van dit proefschrift laten zien dat verschillende factoren geassocieerd zijn met het diëtistisch zorggebruik. Over het algemeen hebben

patiënten, huisartsen, diëtisten, zorgverzekeraars en beleidsmakers een gedeelde verantwoordelijkheid om de resultaten van gewichtsmanagement in de eerstelijnsgezondheidszorg te verbeteren. Verder bevat dit proefschrift een aantal aanbevelingen. Zo is gewichtsgerelateerde zorgverlening bij patiënten met overgewicht die het zelfstandig niet lukt om af te vallen, aanbevolen. Huisartsen kunnen hier een belangrijke rol bij spelen. Bijvoorbeeld door het belang van een gezond gewicht vaker ter sprake te brengen en door te verwijzen voor dieetbehandeling. Verder is het aan te beleven dat zorgverzekeraars en beleidsmakers zich blijven inspannen voor een toereikende vergoeding van dieetadvisering. Voor diëtisten is het onder andere van belang dat zij zich blijven focussen op de motivatie van de patiënten om zijn of haar gedrag te veranderen. Nader onderzoek dient zich te richten op het aantal consulten dat per diëtistische behandeling nodig is om de gezondheid van de patiënt te verbeteren. Tenslotte is meer onderzoek noodzakelijk naar het lange termijn effect van de diëtistische behandeling.

Dankwoord

Dankwoord (acknowledgement in Dutch)

Mijn proefschrift is nu klaar. En dat heb ik aan vele personen te danken. Ten eerste wil ik graag mijn promotoren bedanken.

Dinny, gedurende het schrijven van dit proefschrift heb ik veel van je geleerd. Tijdens het schrijven van de verschillende hoofdstukken had je vaak goede ideeën over een bepaalde invalshoek. Als het stuk voor mijn gevoel klaar was, las jij het altijd nog eens goed door. Dan kwamen er soms punten naar voren waar ik nog niet eerder aan had gedacht. Bedankt voor jouw kritische en frisse blik.

Jaap, je bent vanaf het derde artikel bij dit proefschrift betrokken geraakt als promotor. De inhoud en rode draad van dit proefschrift hebben toen verder vorm gekregen. Jouw betrokkenheid tijdens onze overleggen heb ik altijd als heel waardevol ervaren. Door jouw visie op en brede kennis over de zorg voor mensen met obesitas hebben de hoofdstukken in dit proefschrift meer diepgang gekregen. Hiervoor ben ik je erg dankbaar.

Cindy, je bent vanaf het begin nauw betrokken geweest als copromotor. In de laatste fase van dit proefschrift ben je derde promotor geworden. Je humor, enthousiasme en positieve houding heb ik tijdens de begeleiding altijd erg fijn gevonden. Je stond open voor mijn ideeën en liet me heel vrij in de uitvoering daarvan. Hierdoor werd ik zekerder van mezelf als onderzoeker. Ik wil je hier dan ook voor bedanken.

Ilse, als copromotor ben jij het meest intensief betrokken geweest tijdens mijn promotietraject. Je stond voor me klaar als ik vragen had of wilde overleggen. Ook al had je het druk, je maakte tijd voor me vrij waardoor ik, als ik het even niet meer wist, weer snel verder kon. Ik heb het erg fijn gevonden dat je altijd zo goed met me meedacht. Bedankt voor alles wat je voor me hebt gedaan.

Zonder deelnemers was het schrijven van dit proefschrift onmogelijk. Daarom wil ik alle diëtisten, huisartsen en deelnemers van het NIVEL-consumentenpanel bedanken voor hun medewerking.

De Nederlandse Vereniging van Diëtisten wil ik bedanken voor hun medewerking aan de werving van deelnemers voor een aantal onderzoeken in dit proefschrift. En voor hun professionele beoordeling van vragenlijsten die zijn ontwikkeld voor dataverzameling.

Verder wil ik graag de leden van de leescommissie bedanken voor het beoordelen van dit proefschrift.

Het uiterlijk van dit proefschrift heb ik aan twee personen te danken; Karin van Beek heeft de lay-out van de hoofdstukken verzorgt en Tessa van den Heuvel heeft de omslag ontworpen. Heel veel dank hiervoor!

Ook wil ik alle medewerkers van het NIVEL bedanken die hebben meegewerkt aan de uitvoering van de verschillende onderzoeken in dit proefschrift. Hierbij noem ik er slechts enkelen bij naam: Wil Lokhorst, Karin van Beek, Chantal Leemrijse en Corelien Kloek. Anne Brabers en Margreet Reitsma wil ik ook bedanken voor hun hulp bij het opstellen van de vragenlijst aan de leden van het consumentenpanel. Jan Gravestijn en Jan Meassen wil ik bedanken voor het genereren van een overzichtelijke database waardoor ik gemakkelijk aan de slag kon met data-analyse. Peter Spreeuwenberg, jou wil ik ook bedanken voor je heldere uitleg en hulp bij het uitvoeren van verschillende statistische analyses.

Ten slotte wil ik graag mijn collega's van het NIVEL bedanken voor de prettige werksfeer gedurende de afgelopen jaren. Mijn kamergenoten Margit en Di-Janne wil ik hierbij nog specifiek bedanken voor alle gezelligheid en steun. Dat geldt natuurlijk ook voor mijn vrienden en familie die regelmatig vroegen hoe het ermee ging. Jullie interesse heb ik ook als grote steun ervaren.

Curriculum Vitae

Curriculum Vitae

Jacqueline Tol was born in Boxmeer, the Netherlands, on 5 May 1985. She completed her secondary education in 2002 at the Elzendaal College in Boxmeer. After finishing her secondary education, she studied nutrition and dietetics at the Hogeschool van Arnhem en Nijmegen and graduated as a dietitian in 2006. Additionally, she started her master's degree in Nutrition and Health at Wageningen University (specialization nutritional and public health epidemiology). Directly after completing her master thesis in August 2008, she started a research internship of five months at the Center for Obesity, Assessment, Study & Treatment (COAST), University of California, San Francisco. After that, she started working as an assistant researcher at the Wageningen University. In June 2009 she started working as a researcher at the NIVEL (Netherlands Institute for Health Services Research) in Utrecht and was involved in research on dietetic health services use. Her work has resulted in may national and international publications, including this PhD thesis.

List of publications

List of publications

International publications

Tol J, Swinkels ICS, de Bakker DH, Veenhof C, Seidell JC. Overweight and obese adults have low intentions of seeking weight-related care: a cross-sectional survey. BMC Public Health. 2014;14:582.

Tol J, Swinkels ICS, de Bakker DH, Seidell JC, Veenhof C. Dietetic treatment lowers body mass index in overweight patients: an observational study in primary health care. Journal of Human Nutrition and Dietetics. 2014; 27(5):426-33.

Kloek CJJ, Tol J, Veenhof C, van der Wulp I, Swinkels ICS. Dutch General Practitioners' weight management policy for overweight and obese patients. BMC Obesity. 2014;1(2).

Tol J, Swinkels ICS, Struijs JN, Veenhof C, de Bakker DH. Integrating care by implementation of bundled payments: results from a national survey on the experience of Dutch dietitians. International Journal of Integrated Care. 2013;13:e055.

Tol J, Swinkels ICS, Spreeuwenberg PM, Leemrijse CJ, de Bakker DH, Veenhof C. Factors associated with the number of consultations per dietetic treatment: an observational study. BMC Health Services Research. 2012;12:317.

Tol J, Swinkels ICS, de Bakker DH, Seidell JC, Veenhof C. Patients' experiences and satisfaction with dietetic treatment: results from a Dutch survey. (Submitted).

Tol J, Swinkels ICS, Spreeuwenberg PM, Veenhof C, Seidell JC, de Bakker DH. Changes in health insurance reimbursement system for dietitians: effects on utilization of dietetic services. (Submitted).

National publications

Kloek CJ, Tol J, Veenhof C, van der Wulp I, Swinkels ICS. Huisartsenzorg bij overgewicht en obesitas. Nederlandse samenvatting van "Dutch General Practitioners' weight management policy for overweight and obese patients" Huisarts Wetenschap. 2015;58(2):66-9.

Tol J, Swinkels ICS, Koppes L. Zorg door de diëtist: jaarcijfers 2013 en trendcijfers 2009-2013. Utrecht: NIVEL, 2014.

Tol J, Prins M, Verheij R. Nieuwe website NIVEL Zorgregistraties eerste lijn laat zien welke eerstelijnszorg mensen gebruiken voor welke gezondheidsproblemen. Eerstelijns. 2014;6(3):34-35.

Tol J, Leemrijse CJ, Veenhof C, Swinkels ICS. Jaarcijfers 2012 en trendcijfers 2008 – 2012 diëtetiek. Gegevensverzameling binnen vrijgevestigde praktijken voor diëtetiek. Utrecht: NIVEL, 2013.

Valentijn KJM, Tol J, Leemrijse CJ, Swinkels ICS, Veenhof C. De behandeling van cliënten met diabetes mellitus door vrijgevestigde diëtisten. Utrecht: NIVEL, 2013.

Tol J, Swinkels ICS, Veenhof C. Welke cliënten hebben volgens de diëtist voldoende aan vier uur diëtetiek per kalenderjaar? Tijdschrift voor Gezondheidswetenschappen. 2012;90(3):176-183.

Tol J, Valentijn K, Swinkels ICS, Veenhof C. Jaarcijfers 2011 en trendcijfers 2008-2011: diëtetiek. Gegevensverzameling binnen vrijgevestigde praktijken voor diëtetiek. Utrecht: NIVEL, 2012.

Tol J, Swinkels ICS, Leemrijse CJ, Veenhof C. Minder diëtistische behandeling door grotendeels schrappen diëtetiek uit de basisverzekering. Utrecht: NIVEL, 2012.

Tol J. Meewerken aan onderzoek levert veel op voor de diëtist. Diëtist en onderzoek. NVD Nieuws. 2012;14(1).

Tol J, Swinkels ICS, de Bakker DH, Veenhof C. Jaarboek LiPZ 2010: Beroepsgroep diëtetiek. Gegevensverzameling 2008-2010 binnen vrijgevestigde praktijken voor diëtetiek. Utrecht: NIVEL, 2011.

Tol J, Swinkels ICS, Veenhof C. Al voor invoering van directe toegang diëtetiek ging één op de zeven cliënten op eigen initiatief naar de vrijgevestigde diëtist. Utrecht: NIVEL, 2011.

Tol J, Swinkels ICS, Veenhof C. Omvang zorg verschilt per diëtist. Nederlands Tijdschrift voor Voeding & Diëtetiek. 2011;66(6):25.

Tol J, Swinkels ICS, Leemrijse CJ, Veenhof C. Jaarcijfers 2009 diëtetiek, gegevensverzameling binnen vrijgevestigde praktijken voor diëtetiek. Utrecht: NIVEL, 2010.

Tol J, Swinkels ICS, Leemrijse CJ, Schoenmakers EH, Veenhof C. Wat vinden diëtisten van integrale bekostiging en van directe toegang diëtetiek? Utrecht: NIVEL, 2010.

Swinkels ICS, Kooijman MK, Tol J, Veenhof C. Beschouwing jaarcijfers LiPZ 2009. Utrecht: NIVEL, 2010.

Tol J, Swinkels ICS, Leemrijse CJ, Veenhof C. Jaarcijfers 2008: diëtetiek. Gegevensverzameling binnen vrijgevestigde praktijken voor diëtetiek. Utrecht: NIVEL, 2009.

Conference abstracts

Tol J, Swinkels ICS, de Bakker DH, Seidell JC, Veenhof C. Patients' experiences and satisfaction with dietetic treatment. NWO-retraite: Deurne, October 9, 2014. (Oral presentation)

Tol J, Swinkels ICS, Spreeuwenberg PM, Veenhof C, Seidell JC, de Bakker DH. Changes in health insurance reimbursement system for dietician's: effects on access and utilization of Dutch dietetic services. European forum for primary care (EFPC): Barcelona, September 2, 2014. (Oral presentation)

de Bakker DH, Tol J, Stirbu-Wagner I. Implementing the learning health care system. European forum for primary care (EFPC): Barcelona, September 1, 2014. (Oral presentation)

Tol J, Swinkels ICS, de Bakker DH, Veenhof C, Seidell JC. Overweight and obese adults have low intentions of seeking weight-related care: a cross-sectional survey. Netherlands School of Primary Care Research (CaRe): Nijmegen, June 11, 2014. (Oral presentation)

Tol J. Inzicht in de effectiviteit van diëtetiek. Symposium NIVEL Zorgregistraties, big data van en voor de eerste lijn: Amersfoort, March 18, 2014. (Oral presentation)

Tol J, Swinkels ICS, Spreeuwenberg PM, Leemrijse CJ, de Bakker DH, Veenhof C. What factors are associated with the number of consultations per dietetic treatment. Nutrition & Dietetics 2012; 69 (suppl. 1): 65. International Congress of Dietetics (ICD): Sydney, September 7, 2012. (Oral presentation)

Tol J, Swinkels ICS, Veenhof C. Dietetic treatment improves BMI and physical activity level of overweight patients in the Netherlands, 2006-2011. Nutrition & Dietetics 2012; 69 (suppl. 1): 84. International Congress of Dietetics (ICD): Sydney, September 7, 2012. (Poster presentation)

Tol J, Swinkels ICS, Veenhof C. Dietetic care attributes to the public health of overweight patients in the Netherlands, 2006 – 2011. European Journal of

Public Health; 21 (suppl. 1): 75. European Public Health Conference (EUPHA): Copenhagen, November 10, 2011. (Poster presentation)

Tol J, Swinkels ICS. Onderzoek naar de diëtetiek in de eerstelijns gezondheidszorg. Eerstelijnsbijeenkomsten NVD: Zwolle, October 13, 2011 / Eindhoven, October 17, 2011. (Oral presentation)

Tol J, Swinkels ICS, Veenhof C. Welke factoren zijn gerelateerd aan de omvang van de diëtistische behandeling. LiPZ Symposium, Utrecht, 8 oktober 2011. (Oral presentation)

Tol J, Swinkels ICS, Leemrijse CJ, Veenhof C. LiPZ Maakt zorgproces dietetiek inzichtelijk. TSG: Tijdschrift voor Gezondheidswetenschappen 2011;89(3):88. Nederlands Congres Volksgezondheid, Amsterdam, 6-7 april 2011. (Poster presentation)